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MODERN AMERICAN ENCYCLOPEDIA

PROGRESSIVELY PLANNED

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MODERN AMERICAN ENCYCLOPEDIA

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PREFACE

IN presenting the Modern American Encyclopedia to the public, the editor and publishers take pride in pointing out that it is based on that excellent and authoritative work of an earlier day, The New Student's Reference Work. Like all things in life worth while, an encyclopedia cannot be created in a day. It is rather a product of slow growth. Every merit which made The New Student's Reference Work so popular with hundreds of thousands of purchasers has been retained in this new work. It has been modernized and extended to such a great degree, however, that we have felt a more suitable name to be in order. In searching for a name that would convey more nearly the scope and purposes of this work, we finally chose the title of Modern American Encyclopedia. Modern in thought and appearance, compact to fit the cramped space of our twentieth-century mode of life, comprehensive to meet the needs of our busy, changing world, this newer and greater work, we are confident, will carry on the traditions of its predecessor, The New Student's, and find a still greater place of usefulness in the homes, schools and offices of America.

C.R.F.

KEY TO PRONUNCIATION

ā as in	āle	ē as in	ēve	ō as in	ōld	ŭ as in	ŭp
ā̍	sen′ā̍te	ē̍	ē̍vent′	ō̍	ō̍bey′	û	ûrn
â	câre	ĕ	ĕnd	ô	ôrb	y̆	pit′y̆
ă	ăm	ẽ	fẽrn	ŏ	ŏdd	o͞o	fo͞od
ä	ärm	*e*	re′cẹnt	ū	ūṣe	o͝o	fo͝ot
ȧ	ȧsk	ī	īce	ū̍	ū̍nite′	ou	out
a	fi′n*a*l	ī̍	ī̍de′a	ṳ	rṳde	oi	oil
a̤	a̤ll	ĭ	ĭll	ụ	fụll		

Foreign Consonants are represented by the *nearest* English equivalents.

The Principal Accent is indicated by a heavy mark ′, the secondary accent by a lighter mark ′, at the end of the syllable.

Syllabic Division is indicated by a light hyphen.

Compound Words have their members joined by a heavy hyphen.

(*Q. V.*) is Latin for *quod vide* or *quæ vide*. In articles, after names, it means *see this*, that is, the subject named.

AUTHENTICITY OF THE MODERN AMERICAN ENCYCLOPEDIA

The material in this reference work was prepared by a large number of experts and specialists in the various fields of human knowledge. Further assistance was given by eminent scholars, scientists, and men of affairs, who reviewed and revised various articles. Among those whose work is contained in these volumes, the articles being signed in many instances, are the following:

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MODERN AMERICAN ENCYCLOPEDIA

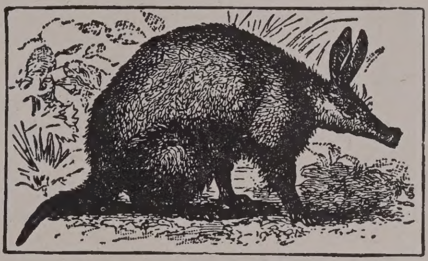
A

A—ABBOTT

A, the first letter in the English alphabet and in many others. In English the letter has several different sounds, as in ah, at, all, ask, ale, fan, private, penal. In the French and other languages of Continental Europe it has but one sound; the broad a as in ah. This is the simplest vowel sound, given with the open mouth and throat.

Aachen (*ä'ċhen*). See Aix-la-Chapelle.

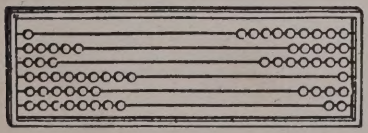
Aardvark (*ärd'värk*: earth pig), an animal of South Africa, called also ant-bear. It is a strongly built animal, about five feet long to tip of tail; has a long snout and strong claws with which it roots and tears apart the ant hills, and with its tongue licks up the ants and other insects which are its chief food. It lives in a shallow burrow and is nocturnal in its habits.



AARDVARK

Aaron, the first high priest of the Israelites. He was the elder brother of Moses, his spokesman at the court of Pharaoh and his assistant in leading the Jewish nation out from Egypt. During the absence of Moses on Mount Sinai he yielded to the cry of the people and made a golden calf for them to worship. Mount Hor, whereon he died, at the age of 123 years, is still called the "Mount of Aaron."

Abacus (*ăb'ă-cŭs*), is the classic name for what is now often called in schools the bead frame, a device for counting by means of beads or discs which have been strung upon parallel wires. Such a machine was in use among the Greeks and Romans. The Chinese and the Persians employ it to this day. In architecture, an *abacus* is the flat tablet above the capital of a column.



ABACUS

Abalone (*ăb'ȧ-lō'nē*), a shelled sea fish of the *Haliotidae* species, popularly known as ear-shells or sea-ears, found on the rocks of the California coast feeding on seaweed. The shell is a flattened spiral, with a lining of bright mother-of-pearl, used considerably in the arts; while the animal itself is used as food by Orientals on the coast, and, gathered and dried, is exported in quantities both to Japan and to China.

Abbey, Edwin Austin, an American artist, was born April 3, 1852, at Philadelphia. In 1883 he removed to England. He was an illustrator of a high order and a painter of watercolors that reveal ability as a colorist. His chief characteristic was love for English country life and scenery and for old poets and dramatists. His most famous painting is *The Quest for the Holy Grail*, in the Boston Library, and his illustrations of Shakspere and Goldsmith are notable. King Edward VII commissioned him to paint the coronation at Westminster. Died Aug. 1, 1911.

Ab'bott, Hon. John J. J. C., born in 1821 at St. Andrews (Quebec), educated at McGill University. Called to the Bar in 1847. For ten years Dean of the Faculty of Law at McGill. At one time a Director of the Bank of Montreal. Counsel for the Canadian Pacific Railway. Elected to the House of Commons 1867. Selected by the Government in 1888 for a mission to Australia to further trade relations and cable communication. Called to the Senate in 1887. Leader for the Government in the Senate from 1887 to 1891. Became Premier of Canada in 1891. Author of the Insolvency Act which he carried through Parliament. Was Mayor of Montreal in 1887 and again in 1888. An authority in Parliament on matters of banking and commerce. He died in 1893.

Ab'bott, Lyman, American preacher, editor and author, was born in 1835, the son of Jacob Abbott. After graduating from the University of the City of New York he studied law, but entered the ministry and became pastor of a Congregational church in Terre Haute, Ind. Later he became editor of *The Christian Union*, New York, now *The Outlook*, and succeeded Henry Ward Beecher as pastor of Plymouth Church, Brooklyn. Here he became widely known both as preacher and editor, and as the author of several commentaries and other books. Among his works are *The Evolution of Christianity; Christianity and Social Problems; An Evolutionist's Theory; The Rights of Man; The Life and Literature of the Hebrews.*

Ab'botsford, celebrated as the home of Sir Walter Scott, is situated on the Tweed river, near Melrose Abbey, Scotland. It was named from a ford where the abbots of Melrose Abbey crossed the Tweed. The house is an irregular, picturesque mansion, built by Sir Walter Scott in 1811, in the style of the old English manor houses. Carved stones taken from old castles and abbeys are placed at intervals in the walls of the house and garden. The lavish use of money in adorning Abbotsford was one of the chief causes of Scott's financial failure.

Abattoir (*ȧb'ȧt'twär'*), originally merely a slaughter-house, but now inclusive of a number of industries connected with the disposal of the parts of animals unfit for food. The term is sometimes made to include also the market at which the products are sold.

What to do with the waste parts of slain animals has always been a problem where population was dense enough to necessitate much butchering. In the time of the Roman Empire the killing was restricted to one section of the city, and here there was a public market, and sometimes, as in Rome, a splendid market building. Previous to 1810 in Paris killing of animals was allowed even along the principal streets, and conditions had become so bad that a commission was appointed in that year to do away with the nuisance. Under the direction of this commission five great abattoirs were opened in September, 1818, and these have to a great extent been models for the world. London did not take up the matter in a serious way until 1852, and then in 1855 opened a great establishment at a suburb called Islington. But it has remained for America, in very recent times, to perfect the greatest of these institutions. Machinery has been so much brought into use that an almost marvelous speed and economy is attained. Perhaps an even more wonderful advance has been made in the matter of using the various parts of the animals which were once a nuisance. Such products as special foods, medicines, building materials, chemicals, manures, etc., utilize practically every particle of an animal and so solve the problem of their disposal.

Abbre'via'tions are used to save time in writing. In letter writing they should on the whole be avoided. Before printing was invented, however, the labor of copying and the cost and scarcity of parchment caused abbreviations to be used so freely that they are apt to be very difficult to follow. Signs, like $ or £ are not, properly speaking, abbreviations, but symbols. An abbreviation generally consists of the first part of a word, or else of the first letters of the words of a well-known phrase. Those which follow still occur frequently:

A. B.	Bachelor of Arts.
A. C.	Ante Christum, before Christ.
A. D.	Anno Domini, in the year of our Lord.
A. D. C.	Aide-de-camp.
A. H.	Anno Hegiræ, in the year of the Hegira, or since 622 A. D.
Ad lib.	Ad libitum, at pleasure.
æt.	ætatis, aged.
A. M.	Ante Meridiem, before noon.
A. M.	Master of Arts.
Anon.	Anonymous.
A. U. C.	Ab urbe condita, from the founding of the city of Rome.
A. V.	Authorized Version.
b.	Born.
B. A.	Bachelor of Arts. Same as A. B.
Bart.	Baronet.
B. C.	Before Christ.
B. C. L.	Bachelor of Civil Law.
B. D.	Bachelor of Divinity.
Bp.	Bishop.
B. S. or B.Sc.	Bachelor of Science.
C.	Centum, one hundred.
C.	Centigrade.
Cantab.	Cantabrigiensis, of Cambridge.
C. B.	Companion of the Order of the Bath.
c. c.	Cubic centimeter.
C. E.	Civil Engineer.
C. M. Cy.	Companion of the Order of St. Michael and St. George.
Co.	Company.
Co.	County.
C/O.	Care of.
C. O. D.	Cash on Delivery.
Cr.	Creditor.
Cresc.	Crescendo, growing louder.
Cwt.	Hundredweight.
d.	Died.
d.	penny.
D. C.	District of Columbia.
D. C.	Da capo, from the beginning.
D. C. L.	Doctor of Civil Law.
D. D.	Doctor of Divinity.
D. D. S.	Doctor of Dental Surgery.
D. G.	Dei gratia, by the grace of God.
Dim.	Diminuendo, less loudly.
D. Lit.	Doctor of Literature.
Do.	Ditto, the same.
Dr.	Debtor.
Dr.	Doctor.
D. Sc.	Doctor of Science.
D. S. O.	Companion of the Distinguished Service Order.
D. V.	Deo volente, God willing.
dwt.	Pennyweight.
e. g.	Exempli gratia, for example.
etc.	Et cetera, and so on.
et seq.	Et sequentia, and the following.
F.	Fahrenheit.
f.	Forte, loudly.
f. o. b.	Free on board.
ff.	Fortissimo, very loud.
F. R. C. P.	Fellow of the Royal College of Physicians.
F. R. C. S.	Fellow of the Royal College of Surgeons.
F. R. G. S.	Fellow of the Royal Geographical Society.
F. R. S.	Fellow of the Royal Society.
G. C. B.	Grand Cross of the Order of St. Michael and St. George

H. M. S.	His Majesty's Ship, or Service.
ibid.	ibidem, in the same place.
i. e.	Id est, that is.
I. H. S.	Jesus hominum Salvator, Jesus the Saviour of men.
Incog.	Incognito, unknown.
Inst.	Instante mense, in the current month.
J. P.	Justice of the Peace.
Jr.	Junior.
K. C.	King's counsel.
K. C. B.	Knight Commander of the Bath.
K. C. M. G.	Knight Commander of St. Michael and St. George.
£	Libra, pound (British money).
lb.	Pound weight.
Litt. D.	Doctor of Letters.
LL. B	Bachelor of Laws.
LL. D	Doctor of Laws.
M.	Monsieur.
MM	Messieurs.
M. B.	Bachelor of Medicine.
M. C.	Member of Congress.
M. D.	Doctor of Medicine.
M. E.	Mining, or Mechanical, Engineer.
Mlle.	Mademoiselle.
Mme.	Madame.
M. P.	Member of Parliament.
MS	Manuscript; plural, MSS.
N. B.	Nota bene, mark well.
Nem. con.	Nemine contradicente, no one opposing.
Ob.	Obiit, died.
Oxon.	Oxoniensis, of Oxford.
p.	Piano, softly.
Ph. B.	Bachelor of Philosophy.
Ph. D.	Doctor of Philosophy.
P. M.	Post Meridiem, afternoon.
pp.	Pianissimo, very softly.
P. P. C.	Pour prendre congé, to take leave.
p.	Page; plural pp.
pro tem.	Pro tempore, for the time.
prox.	Proximo mense, in the next month.
P. S.	Post scriptum, postscript.
Q. E. D.	Quod erat demonstrandum, which was to be proved.
Q. E. F.	Quod erat factendum, which was to be done.
q. v.	Quod vide, which see.
R. A.	Royal Academician.
R. I. P.	Requiescat in Pace, may he rest in peace.
R. M.	Royal Marines.
R. N.	Royal Navy.
R. S. V. P.	Répondez s'il vous plait, please reply.
R. V.	Revised Version.
S.	South, shilling, or saint.
S. P. Q. R.	Senatus populusque Romanus, the Senate and Roman People.
sq.	Sequens, the following; plural sqq.
Sr.	Senior.
S. S.	Steamship.
ult.	Ultimo mense, last month.
U. S.	United States; U. S. A.
U. S. N.	United States Navy.
V. C.	Victoria Cross.
v. or vs.	Versus, against.

Abd=el=Kader (*ăbd'el-kä'dĭr*) (born 1806, died 1883), was emir or prince of the Arab tribes in Algeria. He is famous for his stubborn resistance to the French, who, in 1830, had driven out the Turks, the former rulers of the country. For eighteen years he fought with bravery and high generalship against the larger forces of the French. Five successive generals were sent against him, some of the tribes were bribed to desert, and the Moors were made to attack him. Yet he utterly defeated the French twice, and kept up a successful resistance till 1848, when he was defeated, and soon after captured and imprisoned for four years at Paris. In 1860 Abd-el-Kader was in Damascus, and, at great risk to himself, aided the Christians during the Mohammedan riots. In the later years of his life he was a pensioner of the French government.

Abdul=Hamid II (*ăb'dŏŏl-hä'mīd*), Sultan of Turkey and tributary states, from 1876 to 1909, was the second son of Sultan Abdul-Medjid, of the House of Othman. He was born Sept. 22, 1842, and succeeded to the throne on the deposition of his elder brother, Murad V, on Aug. 31, 1876. He was a Turk and Mussulman of the old school and consequently showed little inclination towards reform within the Ottoman Empire, which was stipulated by the Treaty of Berlin, in 1878, following on the war with Russia of the previous year, which proved disastrous to the Porte. In later years he lived under the dread of assassination and showed distrust even of his own ministers. He looked askant at England's operations in Egypt, and was believed to have secretly stimulated the rebellion of Arabi Pasha in 1882.

The same malign influence was also known to be at work in Armenia, where the Christian world was horrified at the atrocities committed there by the Turkish soldiery. Resistance to the outrage and rapine there has been greatly handicapped by jealousies among the European Powers.

In 1908, following a revolt led by the Young Turks' party and involving the army, Abdul was forced to grant a Constitution, and an assembly, but in April 1909, a revolt against the new order was instigated by the Sultan. This was quickly put down. Abdul Hamid was dethroned and his brother Reshed Effendi was placed on the throne as Mehmed V. Abdul Hamid died "in dignified captivity" at Salonica, Feb. 10, 1918.

A Becket. See Becket.

A'bel, the second son of Adam, was a shepherd and offered a sacrifice of the "firstlings of his flock." His offering was preferred to that of his brother Cain, who in anger killed him. This violent death gave him the title of the "first martyr."

Ab'elard (*ăb'e-lard*), **Pierre,** a brilliant French scholar, was born in Brittany in 1079. Moved by a thirst for knowledge he gave his family inheritance up to his brothers and went to Paris, where he devoted himself to study. His fearless independence intellectually, and his success in public debates, led him to establish a school of his own, which became so famous that other teachers were almost deserted. He fell in love with Héloïse, a beautiful and accomplished girl, one of his pupils. As marriage would interfere with his rising in the church, Abelard and Héloïse were secretly united. Their union soon became known, and they separated, Abelard becoming a monk and Héloïse a nun. Devoting himself to theology he was tried and convicted of heresy, and driven to found a hermitage, which he called the Paraclete. He gave up this retreat to Heloïse, and when he died, in 1142, she had him buried there. At her death she was interred by his side. In 1800 their remains were removed to Paris, where they now rest in the cemetery of Pére-la-Chaise, A figure of Abelard reclines on the tomb, and by its side stands a statue of Héloïse.

Abercrombie (*ab′er-krŭm-bĭ*), **James** (born 1706, died 1781), a British general who took part in the French and Indian war. In 1758 he was appointed commander-in-chief of the forces in America. He attacked Ticonderoga at the head of 15,000 men, but was defeated by Montcalm (July 8, 1758). He returned to England, where he became a member of parliament and governor of Stirling Castle.

Aberdeen (*ăb-er-dēn′*), the principal city of northern Scotland, receives its name from two Gaelic words meaning "at the mouth of the Dee," where it is situated, about 100 miles northeast of Edinburgh. Its charter dates from 1179. It was burned by the English in 1336, and after its restoration called New Aberdeen. It has large factories of cotton, woolen and linen fabrics, exports granite extensively, and is engaged in whale fisheries and in shipbuilding. It is the seat of the University of Aberdeen. Population 163,084.

Aberdeen, Earl of (Rt. Hon. J. C. Hamilton-Gordon, P.C., G.C.M.G.), a Scottish Liberal peer, was born Aug. 3, 1847, and educated at St. Andrews and at Oxford. He succeeded to the title in 1870. In 1886 he was appointed by Mr. Gladstone Lord-lieutenant of Ireland, with the mission of carrying out the Home Rule policy of the then Liberal government. This office he held but a few months, though he was very acceptable to the Irish people; but with the fall of the Gladstone administration he resigned the post, and subsequently made a tour of the world, visiting the chief British colonies. From 1893 to 1898 he acted as Governor-General of Canada, and later he was Viceroy of Ireland.

Abitibi (*ä′bê-tib′ê*). Two important lakes and a river of the same name in northeastern Ontario (Canada). The upper Abitibi Lake (connected with the lower by a "Narrows" about two miles in length) covers an area of about 190 square miles, one-third of this area being in the Province of Quebec. One-half of the shore line is rocky. Innumerable islands of all shapes and sizes dot the lake, giving it a natural beauty equal to that of the St. Lawrence River. The lower lake has an area of 145 square miles. The Abitibi River discharges the waters of these two lakes, emptying with other streams into the Moose River, which a short distance further on empties into James' Bay.

Abolition of Slavery. See Slavery.

Aborigines. See Indians.

Aboukir. See Nile, Battle of.

Abraham, the head of the Hebrew nation, was born at Ur, in Chaldæa, about 2000 B. C. He left his people, who were idolaters, to worship the one God, and dwelt in Palestine, leading the life of an Arab chief. His original name, Abram, was changed to Abraham, meaning "father of a great nation." He died near Hebron, aged 175 years, and is noted for his faith in God, being called the "Father of the Faithful."

Abraham, Plains of. A level tract of land about one mile in width immediately west of the city of Quebec, named after Abraham Martin, who at one time owned it. The scene of the memorable battle, which wrested from the French their supremacy in North America.

The British troops had been besieging the city for some time without success. Autumn was approaching and the admiral in command of the fleet refused to remain longer. Wolfe, the young general in command of the army, resolved on one last desperate venture. Embarking all his available troops on the vessels of the fleet he moved up the St. Lawrence some miles beyond the city. The French were bewildered by the ever-changing tactics of their opponents, and when, on the night of the 12th of September (1759), the British army dropped down the river in boats and scaled its precipitous bank, there was only a small guard at the top to offer ineffectual opposition. Daybreak found Wolfe's army drawn up in battle array on the plains. The gallant French general, Montcalm, immediately marched from the city with all his available troops and impetuously attacked the British forces. The thin red line of British troops held their fire until the French were within 40 paces and then shattered their ranks with two accurately delivered volleys. The French ranks broke and fled, and Wolfe lived long enough to know that his desperate attempt had been entirely successful. Montcalm died a few hours later. The British loss was some fifty killed and five hundred and ninety-seven wounded, while that of the French was about one thousand five hundred, including two hundred and fifty prisoners.

On the 17th of the same month the city surrendered and (save Montreal) Canada was in the hands of the British. The following spring the French force marched from Montreal over well-nigh impassable roads, and a second and bloodier battle was fought on the plains, resulting in the British force being repulsed and driven within the walls. The timely arrival of some British frigates, however, caused the siege to be raised, and Quebec and all Canada then became part of the British possessions.

The celebration of the coming of the great voyager Champlain to Quebec was held in 1908, and in this connection there was consummated a movement to make the Plains of Abraham a National Park, and erect in its center a monument to Peace.

The federal government of Canada and the governments of the various provinces as well joined in aid of this celebration which proved to be one of the most imposing ever held in Canada. The presence of the Prince of Wales, who came to Canada specially to take part in it, added to the enthusiasm of the occasion.

Abruzzi (*ȧ-brōōt'sē*), **Duke of,** known also as Prince Amadeo of Savoy, a member of the royal house of Italy and a distinguished explorer, aeronaut, sportsman and scientist, son of ex-King Amadeus of Spain, was born in 1873 in Madrid and educated in part at the Naval College in Leghorn. As a youth he travelled round the world, and in 1896 successfully ascended Mount St. Elias, in Alaska, whose ice-covered peak is over 18,000 feet in height. In 1899 the Duke set out from Christiania on an Arctic voyage in the *Stella Polare*, and wintered in Teplitz Bay, 81° 47′ N. There he organized a sledge party, to proceed toward the North Pole, but an accident to his ship prevented the Duke from accompanying it. It was, however, manned under the command of his chief officer, Captain Cagni, the expedition reaching the most northerly point attained up to that date, viz.: 86° 34′ N., or within 236 statute miles of the Pole. In 1906 the Duke climbed Mount Ruwenzori, in equatorial Africa, and in 1909 led a mountain-climbing expedition to the Himalayas, where he established a new altitude record by reaching the top of Mount Godwin-Austin. In 1915 and 1916 he commanded the Italian fleet in the World War.

Ab'salom, the third son of King David, was noted for his personal beauty and winning manners. By these qualities he seduced the people into rebellion against his father. He was defeated in battle, caught by his beautiful hair in the branches of an oak as he fled, and slain by Joab against the orders of his father, who mourned his death in a most touching lament.

Absinthe (*ăb-sinth'*), a popular French liquor, agreeable to the taste, but one of the most dangerous stimulants ever manufactured. It is made from oil of wormwood and alcohol, with the addition of several volatile oils.

Absorp'tion (in plants), the method by which almost all plants take materials from the outside into their bodies. Plants absorb water and a great variety of substances soluble in water. Because the protoplasm of plant cells forms about each a continuous covering, the cell wall having no visible openings, and because both cell wall and protoplasm hold among their particles large amounts (50–98 per cent) of water, all substances, whether solid or gaseous, must be dissolved in water before they can enter the plant. When so dissolved the particles are free to move through the water, and tend to distribute themselves uniformly. As the water outside is continuous with that forming part of the body, the particles may migrate into the plant almost as readily as in other directions. They will enter it if of suitable size, and if the water inside contains less of that substance than the water outside. The movement of each sort of material is independent, and a substance will continue to enter until it becomes equally distributed. If it is being used or stored, it may be absorbed in large amounts. Similarly water moves from the places where there are fewest particles of all the dissolved substances, *i.e.*, where there is most water, toward the places where there is relatively less water. As water is constantly evaporating from land plants large quantities of water must be absorbed to balance this loss. The absorption of all substances is subject to regulation by the living protoplasm. Not all substances soluble in water are permitted to enter, nor at all times.

Abstinence. See TOTAL ABSTINENCE.

Abt (*äpt*), **Franz,** born at Eilenburg, in Saxony, Dec. 22, 1819. As his father, who was a clergyman, designed to educate him for his own profession he was placed in the St. Thomas school and in the University of Leipsic, where he had the advantage of good training in music as well as in the usual academic branches. He finally relinquished his theological studies for the more congenial musical studies. In 1841 he obtained the position of capellmeister at Zurich, and eleven years later obtained the same position at Brunswick. His death occurred at Wiesbaden, March 31, 1885.

Abt is best known as a composer of part-songs for men's voices. His early residence at Zurich, where he conducted male singing societies, developed a facility in this class of composition that resulted in his great popularity. His songs for a single voice have had wide acceptance, notably the one entitled "When the Swallows Homeward Fly." Besides songs he has written pieces for the pianoforte, which are regarded as inferior to his vocal compositions. In all, his works embrace more than four hundred numbers, none of which, however, entitles him to rank with the great German composers.

Aby'dos (*a-bī'dos*), an ancient city in Asia Minor, celebrated as the place where Xerxes crossed the Hellespont in his invasion of Greece, in 480 B. C. When his bridge of boats, nearly a mile in length, was swept away by a storm he punished the sea by inflicting three hundred lashes and casting chains into its waves. When the second double bridge was built, Xerxes poured an offering of wine on the waters and prayed to the sun; then throwing a cup and a Persian sword into the Hellespont he ascended his throne on the heights of Abydos. Here he watched for a whole week the ceaseless march of his army, perhaps a million in number, made up of forty-six different nations, each dressed in its national costume. Abydos is famous also as the scene of the story of Hero and Leander, which see.

Abyssinia (*ăb′i-sin′ĭ-ȧ*), a country of eastern Africa, southwest of the Red Sea. It is a tableland, from which rise flat-topped mountains, intersected by deep valleys and gorges. The royal house, which reigned for centuries, traced its lineage back to the Queen of Sheba. In 1850 Theodorus, a military adventurer, revolted and was crowned emperor. He first sent embassies to England and France and received a British consul at his court. It was his imprisonment of the consul and of an embassy sent to inquire into the matter that caused the English government to send Sir Robert Napier from Bombay with a relief expedition. The capital, Magdala, was stormed and captured, Theodorus shooting himself when told that the city gates had given way. This occurred in 1868, and for some time after the English forces withdrew lawlessness prevailed. In 1872 John II was crowned emperor. He was killed in battle in 1889 and was succeeded by his adversary, Menelek, who died in 1913. Empress Waizeru Zanditu is the present ruler. In 1885 Italy occupied the port of Massowah, and sought to acquire territory inland, claiming, by treaty in 1889, a protectorate over Abyssinia. This led to a protracted war, and in 1896 the Italian army of invasion was beaten with great loss. As a result, Italy withdrew her claim to a protectorate over Abyssinia. In 1902 the boundary between Abyssinia and the British Sudan was adjusted by treaty. The area of Abyssinia is over 400,000 square miles, with an estimated population of five and a half millions. There are many small towns, few with a population exceeding 5,000. But little land is cultivated, the chief pursuit of the people being the herding of cattle, sheep and goats. A railway line connects Diré Dawa in southeastern Abyssinia with the port of Jibuti, 186 miles distant. Telegraph and telephone systems are in use. Barley, wheat, millet, hops and tobacco are produced in considerable quantities. The annual product of coffee is about 50,000 bags.

Academy, The French, founded in 1635 by Cardinal Richelieu, was the great authority in France in all matters of scholarship until it was disbanded during the French Revolution in 1793. Its members were forty of the first scholars of the country, who met three times a week. Its greatest work was the publication of its dictionary of the French language after fifty years of labor. The Academy was reconstructed in 1795, and in its original form it was restored by Louis XVIII in 1816.

Aca′dia (*a-kā′dĭ-a*) or Acadie. It was in 1497, or thereabouts, that the Cabots visited, if they were not the discoverers of, Nova Scotia. French Colonists came here in 1604. They were driven out by settlers from Virginia who rested their claim on the right of discovery. The French gave the land the name of Acadie. In 1621 it was changed to Nova Scotia. In 1621 James I granted the peninsula to Sir William Alexander. In 1654 the French again established themselves in the colony. The country was ceded to them in 1667, but the English regained it in 1713.

The French Acadians now make one-tenth of the population of Nova Scotia. In only one county (Richmond) have they a majority. They are as one to four of the population of New Brunswick. Their settlements in New Brunswick are compact. One-seventh of the population of Prince Edward Island is Acadian. Their chief center in Prince Edward is at Tignish, on the west coast. There are 140,000 Acadians in the maritime provinces.

Accordion (*ăk-kor′dĭ-ŭn*), a musical instrument invented by Damian, at Vienna, about 1829. It is made on the principle of a bellows, the sound being produced by the action of wind on metallic reeds. Keys are ranged on each side, which are touched by the fingers as the instrument moves backward and forward. It is manufactured chiefly in Paris.

Acetylene (*a-sĕt′ĭ-lēn*) (C_2H_2), a gas, slightly lighter than air, which is extensively used for illumination. It burns with a brilliant, white flame, which is smoky, except when specially constructed burners are used. It is usually prepared by the action of water upon a calcium carbide, a material made by exposing a mixture of limestone and coke to a very high heat in the electric furnace. With air, acetylene gives explosive mixtures, and when under pressures of two or three atmospheres, or more, it is powerfully explosive by itself. The pure gas is said to be odorless and non-poisonous, but, as usually made, it contains small quantities of strong-smelling and somewhat poisonous gases. Acetylene gas is widely used in villages and country houses not served by ordinary gas systems, consumers installing necessary apparatus and generating their own gas.

Achaean League (*ä-kē′ ȧn lēg*), originally a confederacy of ten cities of Achaia, which grew into power after the fall of the greater Greek powers. Later it included nearly all the Greek cities, and for fifty years resisted the attacks of Rome.

Achaia (*ă-kā′yă*), one of the ancient divisions of the Peloponnesus, extending along the Gulf of Corinth. Its inhabitants were the most powerful of the Greeks at the time of the Trojan war. Under the Romans Achaia included the whole Peloponnesus as well as the country across the gulf as far as Thessaly. In modern Greece it is a small province.

Acheron (*ăk′er-ŏn*), in ancient mythology, a river of the lower world around which hovered the shades of the departed, and across whose waters the ferryman, Charon (*ka′ron*), piloted those who were permitted to enter the realm of the dead. Acheron was also a general name for Hades.

Achilles (*a-kĭl′lēz*) was the bravest of the Greeks in the Trojan war, and the hero of the *Iliad.* His father, Peleus, was a descendant of Zeus, the king of the gods, and the ruler of the Myrmidons, the warlike people of Phthia, in Thessaly. His mother, Thetis, a sea goddess, is said to have dipped him by the heel into the river Styx to make him invulnerable, as she had been forewarned that he was doomed to an early death. For the same reason, after he had been trained in the arts of war and eloquence by Phœnix, and in the healing art by the centaur, Chiron (*kī′ron*), his mother had him brought up secretly as one of the daughters of the King of Scyros (*sī′ros*). At the outbreak of the Trojan war an oracle declared that Troy could not be taken unless Achilles were present. So Ulysses, the wisest of the Greeks, came to Scyros disguised as a peddler, and spread out his wares before the daughters of the king. Ulysses sounded an alarm, and while the girls ran away the disguised Achilles betrayed himself by seizing a sword and spear from the peddler's stock. Achilles went to war with fifty-seven ships, and during the first nine years he sacked twenty-three cities around Troy. He quarreled with Agamemnon over a maid, Briseis, whom he loved. When she was taken from him he sulked in his tent, while his countrymen were hard pressed because their bravest warrior, whom the Trojans dreaded, was not there. At last his friend Patroclus, wearing the armor of Achilles, drove the enemy before him, but was slain by Hector, the leader of the Trojans. Achilles, enraged at the death of his friend, went against the Trojans and drove them within their walls. In single combat he killed Hector, whom he dragged three times around the city at his chariot wheels. Here the *Iliad* ends, but the story is taken up by the *Æthiopis*, a poem by Arctinus, which tells of the combat of Achilles, first with the Amazon Penthesilea, and next with Memnon. When Memnon fell, Achilles drove back the Trojans to the Scæan gate, where he was killed by an arrow from the bow of Paris, which pierced his vulnerable heel.

Ac′id, a term used in chemistry to denote a class of substances whose union with an alkali, or other base, forms salts. Strictly speaking, all acids contain hydrogen, and are, in fact, salts of hydrogen. Most of them have the following properties: they can be dissolved in water, they have a sour taste; they turn vegetable blues to red. The most common and useful inorganic or "mineral" acids are sulphuric, nitric and hydrochloric acids, which are manufactured on a very large scale. Among the organic acids are acetic acid, which gives vinegar its sour taste; citric acid, which produces the sourness in lemons; oxalic acid, which is found in sorrel and some other plants, and which in large quantities acts as a poison; malic acid, found in apples and also currants and gooseberries; tartaric acid, found in grapes and used in the manufacture of baking powder; prussic or hydrocyanic acid, a deadly poison, a small quantity of which is found in bitter almonds and in the leaves and stones of peaches. Many hundred acids are known to chemists, the greater part of which are artificial.

Aconcagua (*a-kon-ka′-gwa*), a central province of the Republic of Chile, bounded on the north by the province of Coquimbo, on the south by Santiago and on the southwest by Valparaiso, flanked on the east by the Andes and the Argentine Republic, and on the west by the South Pacific Ocean. Its area is 5,485 square miles' with a total population of 131,331. Its capital is Felipe. On the range of the Andes, within the Argentine boundary, is the extinct volcano of Aconcagua, deemed the loftiest elevation in the New World, with an estimated height of 23,000 feet. The Aconcagua River flows seaward through the province and gives the latter its chief fertility in grain, hemp and a variety of fruits Copper deposits are found in the province.

A′corn, fruit of the oak, a nut once considered an important article of food. The ancients thought eating "oaken mast" gave length of years and strength to man. The Indians of New England and farther south ate the acorns of white oaks of several species. The sweet acorn of the California white oak, Indians of the Pacific Coast bake, shell and grind into a coarse meal from which they make bread. Chinese and Japanese use certain acorns for food. Today in some English villages the people hold to the old "right of pannage," and in autumn turn their hogs into the royal forests to fatten on the fallen acorns.

Acoustics (*a-kōōs′tĭks*). Those phenomena which one detects by the ear are generally studied together under the head of acoustics. But whenever any sound is heard we find that somewhere in the neighborhood there is what we call a sounding body, and this is always found to be a body in rapid vibration. Besides this we find that if the sounding body be supported on a bit of cotton wool, placed under the receiver of an air pump, and the air exhausted, the sound is almost entirely extinguished. We are thus led to believe that two things are always essential to the production of sound, *viz.*, a rapidly vibrating body and an elastic medium, generally air, between that body and the ear.

Accordingly the subject of acoustics is made to include a study of vibrating bodies, such as a piano wire, a violin string, an organ pipe, etc., and also of the bodies which transmit vibrations to the ear, such as air, wooden rods and other elastic media.

The structure of the ear and the sensation of sound are generally studied under physiology, and are seldom included under acoustics.

A VIBRATING STRING

One of the most typical of vibrating bodies is a stretched string, such as is employed in the guitar or the harp. When a string of this kind is plucked by the finger a series of waves is started in the string, and these waves are reflected from the fixed ends of the string in such a way that the string vibrates as a whole, to and fro, in a manner familiar to every one. It has been found by experiment that the number of vibrations which a string will make in one second, *i.e.*, the *pitch* of the string, depends upon three things only, namely, the length of the string, the force with which it is stretched, and the mass of unit length of the string. This may be described more definitely as follows:

If we denote by n the pitch of the string, whose length is l, by T the stretching force, and by m the mass of unit length, then

$$n=\frac{1}{2l}\sqrt{\frac{T}{m}}$$

Evidently, therefore, we can raise the pitch of a string in two ways, either by increasing the stretching force, *i.e.*, by increasing T, or by shortening its length, *i.e.*, by diminishing l.

SOUND A WAVE MOTION

The evidence for thinking that the disturbance which we call sound is a wave motion in the air is as follows:

1. Sound is reflected from buildings or hillsides just as water waves are reflected from a wharf. This is the familiar phenomenon of the echo.

2. Two sounds can be added together to produce silence. The simplest method of doing this is to hold a tuning fork near to one ear, front of you, and while it is still vibrating rotate it slowly about its stem as an axis. It is found that there are certain positions in which the disturbance from one prong of the fork will just annul the disturbance from the other prong of the fork, thus adding two sounds together to produce silence.

3. Sound waves can actually be seen by properly illuminating the air with an electric spark. This was first done by Toepler of Dresden. More recently Professor R. W. Wood has succeeded by this method in making instantaneous photographs of sound waves, showing just what portions of the air are condensed and what portions are rarefied at the instant.

SPEED OF SOUND IN AIR

It has been found by experiment that sound waves of all lengths travel in air with the same speed. This is evident, indeed, from the fact that the "time" of an orchestra is just as perfect at long distances as at short distances.

Among the best measures of this speed are the following:

OBSERVER.	SPEED OF SOUND IN METERS PER SEC. TEMP. = 0°C.	METHOD.
Moll and Van Beck .	332.77	Eye and ear
Regnault.	330.71	Mechanical
Szathmari.	331.57	Unison

As a mean we may take 332 meters per second, which is equivalent to 1,089 feet per second, at a temperature of 0° C. Newton and Laplace first showed how the speed of sound may be computed in any gas as soon as its pressure and its density are known. For they proved that if V denotes the speed of sound in a gas in which the density is D and the pressure P, then

$$V=\sqrt{\frac{kP}{D}}$$

where k is a constant, which for most gases has the approximate value of 1.4. But it has been found that the value of this constant, k, depends upon the number of atoms in one molecule of the gas. If there is but one atom in the molecule then $k=1.6$. Accordingly when chemists wish to determine how many atoms there are in a molecule of any given gas they measure the speed of sound in that gas, then measure the pressure and density, and afterward compute k by the use of the expression given above.

MUSICAL TONES

The sound which is produced by a regular and rapid vibration is called a "musical tone," while the sound which is produced by irregular vibrations is called a "noise." Every musical tone possesses three features by which it may be distinguished from all other musical tones. These are *loudness*, *pitch* and *quality*.

1. It has been shown that *the loudness or intensity of a sound depends simply upon the amplitude of the vibrating air particles at the ear.* The loudness of a sound will

therefore, vary not only with the distance of the sounding body, but also with the amount of vibration in the sounding body.

2. *The pitch of a note depends simply upon the number of vibrations per second, that is, the frequency of the body which produces it.*

3. But even when notes have the same loudness and the same pitch they may be quite different, as, for instance, the difference between middle C on the guitar and on the piano. Two notes of this kind are said to differ in *quality*. And *quality has been shown to depend upon the presence of other notes, called overtones, along with the note under consideration.*

THE MUSICAL SCALE

When we consider one tone in relation to other tones we are led to a study of the musical scale. Two definitions are necessary to any understanding of the musical scale, *viz.:*

1. A *musical interval* between any two notes is defined as the ratio of their frequencies. Two notes which have the same frequency are said to be in *unison*. But if the ratio be 2:1 then the interval is said to be an *octave*.

2. *The Major Triad.*—It is a very remarkable fact that the ears of all western nations consider any three notes whose frequencies are in the ratio 4:5:6 as harmonious. Such a combination is called the *major triad*, and is always pleasing to the ear.

The interval between any note and its octave is divided by musicians into a series of seven smaller intervals, called *tones* and *semitones*. These tones are called by letters of the alphabet, and together form what is known as the musical scale.

THE MAJOR SCALE.

Name of Note.	C	D	E	F	G	A	B	${}_2$C
Name of Note in Vocal Music	do	re	mi	fa	so	la	si	do
Interval.	$\frac{9}{8}$	$\frac{10}{9}$	$\frac{16}{15}$	$\frac{9}{8}$	$\frac{10}{9}$	$\frac{9}{8}$	$\frac{16}{15}$	

From inspection of this table it will be readily seen that the entire Major Scale, as it is called, is made up of the three following major triads:

C : E : G = 4 : 5 : 6
F : A : 2C = 4 : 5 : 6
G : B : 2D = 4 : 5 : 6

For an excellent experimental discussion of acoustics, see Tyndall's *Lectures on Sound* (Appleton), and Blaserna's *Theory of Sound* (Int. Sci. Series). The great masterpiece in the literature of acoustics is, however, Helmholtz's *Sensations of Tone*, trans. by Ellis (Longmans). HENRY CREW.

Acre (*ä-ker* or *ā-ker*), a seaport of Syria. Its harbor is the best on the neighboring coast. It is very old, and famous for the attacks and sieges it has sustained, particularly the assault of Richard Cœur de Lion in 1191, and the sixty days' siege of Napoleon in 1799. Population, 10,000.

Acropolis. See ATHENS.

Ac'tinism (Gr. *aktin*, a ray), the chemical property of light, solar or other radiant energy, as the sun's rays in photography, and by which chemical changes are produced. The sun-recording instrument which measures and records the quantity of actinism present is called the *actinograph;* while the actinometer is the instrument or apparatus for measuring the chemical effects of radiation from any source, as in measuring the intensity of the rays on a photographic plate, or piece of sensitized paper, when exposed to the sunlight.

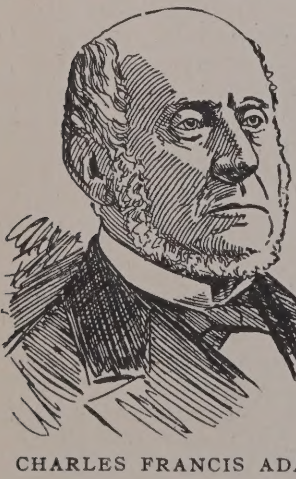
Ac'tinomor'phic (*ak'tĭn-o-môr'fĭk*) **Flowers.** Those whose parts are repeated uniformly about a center, like the parts of a radiate animal. Such flowers are often called "regular." Although the name applies to all parts of the flower it is most commonly used in connection with the petals. When the petals are all about alike and equally spaced about the center, as in the buttercup and the rose, the flower is actinomorphic. The contrasting phrase is "zygomorphic flowers." The noun form of the word is "actinomorphy."

Actium (*ak'shĭ-ŭm*), in Acarnania, the scene of the naval battle in which Octavius, afterward called Augustus Cæsar, conquered Mark Antony and Cleopatra and became, in consequence, emperor of Rome. The number of ships on each side was about the same, but the battle was lost by the cowardice of Cleopatra, who fled with her triremes (ships propelled by oars) as soon as attacked, followed by Antony, who would not be separated from her even to win an empire. The Actian games, occurring every four years, were established here by Augustus in honor of his victory.

Ad'am, the first man, the father of the human race. His sons were Cain, Abel and Seth. He lived to be 930 years old, and through his son Seth was the direct ancestor of the Hebrew nation.

Adam, Graeme Mercer. Born in Midlothian, Scotland, 1839. Educated at Edinburgh. Came to Toronto in 1858. Engaged in publishing and as bookseller (wholesale). In 1861 published the *British American Magazine*. From 1869 to 1872, edited the *Canada Bookseller*. In 1872 with Professor Goldwin Smith and others, he established the *Canadian Monthly*. Sole editor of it from 1879 to 1883. Established the *Canadian Educational Monthly* and so ably edited it for five years that it was recognized as one of the best of the kind on the Continent. For some time editor and manager of the *Bystander*, assisting Professor Goldwin Smith. In 1883 edited the *Royal Canadian Readers*. Wrote *Illustrated Quebec*, *Illustrated Toronto*, *Canada from Sea to Sea*, *Scenic America* and several similar volumes. Contributor to *Picturesque Canada*, which was edited by Principal Grant. Revised *Collins' Life of Sir John A. Macdonald*. Became editor in 1896 of *Self-Culture*, a new magazine published in Chicago. A volunteer officer. Commanded a company at Ridgeway, and was on that occasion presented with an address and a sword.

Adami (*ä-dä'mee*), **John George,** M.A., M.D., F.R.S.S., LL.D., was born in Manchester, Eng., Jan. 12, 1862, son of the late John George Adami. He was educated at Owen College, Manchester, and at Christ's College, Cambridge, studying afterward in Breslau and Paris. He took distinguished honors at Cambridge in natural science, was Darwin prizeman in 1885, M.R.C.S., and was appointed demonstrator of pathology in Cambridge University in 1887. Elected fellow of Jesus College, Cambridge, in 1891, he soon after became head of the pathological department of the Royal Victoria Hospital. Since 1892 he has been professor of pathology in McGill University, Canada. He is the author of numerous monographs upon subjects relating to pathology in French, German, English and American medical journals, and of many papers read before medical societies.



CHARLES FRANCIS ADAMS

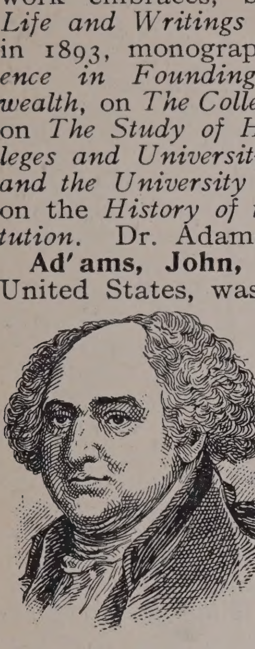
Ad'ams, Charles Francis, the son of John Quincy Adams, was born in Boston, Aug. 18, 1807. He graduated at Harvard College in 1825, and studied law with Daniel Webster. He was for five years a member of the Massachusetts legislature; in 1848 he was the Free Soil candidate for Vice-president, and was elected congressman in 1858, joining the Republican party. He came into great prominence as American minister to England (1861–1868), the same office formerly held by his father and grandfather. He found the great body of Englishmen hostile or indifferent to the United States. His position was one of the greatest responsibility and delicacy. In discharging its duties he showed ability and tact of the first order, and made a reputation as one of the most brilliant diplomatists ever sent out from Washington. He died at Boston, Nov. 21, 1886.

Ad'ams, Charles Kendall, LL.D., president of the University of Wisconsin, was born at Derby, Vermont, Jan. 24, 1835, and educated at the University of Michigan. He also studied in Germany, France and Italy. From 1867 to 1885 was professor of history in the University of Michigan, and from the latter year until 1892 was president of Cornell University. In 1892 he was elected president of the University of Wisconsin. He was the author, among other writings, of *Democracy and Monarchy in France;* of a *Manual of Historical Literature;* and of a monograph on *Christopher Columbus*. From 1892 to 1895 he acted as editor-in-chief of *Johnson's Universal Cyclopaedia*. He died July 25, 1902.

Adams, Henry (1838), American historical writer, third son of the late Charles Francis Adams, was born in Boston, Mass., and educated at Harvard, where he graduated in 1858. Three years later he accompanied his father as private secretary when that diplomat was appointed American Minister to England, and on his return to this country he was for several years instructor at Harvard. During the years 1875–76 he edited *The North American Review*, and in the latter year he published a work on *Anglo-Saxon Courts at Law*. Later on he took up his residence at Washington, and there devoted himself to historical research, writing *Lives* of *Albert Gallatin* and *John Randolph*, and an important *History of the United States*, in nine volumes, treating of the period 1801–17, the administrations of Jefferson and Madison. The latter work was published in 1889–91.

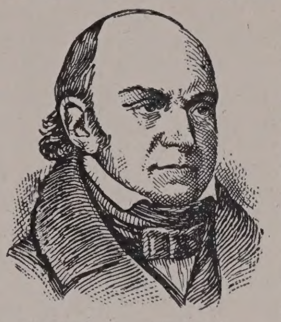
Adams, Herbert Baxter (1850–1901), American historian and educator, born at Amherst, Mass., and educated at Amherst College and at Heidelberg, Germany, obtaining at the latter the degree of Ph.D. Returning to the United States about the era when Johns Hopkins University was founded Dr. Adams became associate professor in that institute and subsequently was appointed full professor. He also became historical lecturer at Smith College, Northampton, Mass., and for a time lectured at Chautauqua. He took part in the inception of the American Historical Association and acted as its first secretary, subsequently becoming first vice-president.

He edited an important series of educational monographs issued by the U. S. Bureau of Education, and was editor also of the Johns Hopkins *Studies in History and Political Science*. His other published work embraces, besides his two volume *Life and Writings of Jared Sparks*, issued in 1893, monographs on *Maryland's Influence in Founding a National Commonwealth*, on *The College of William and Mary*, on *The Study of History in American Colleges and Universities*, on *Thomas Jefferson and the University of Virginia*, and a work on the *History of the United States Constitution*. Dr. Adams died in 1901.



JOHN ADAMS

Ad'ams, John, second President of the United States, was born at Braintree, Mass., Oct. 19, 1735. The father of John Adams was a farmer of small means, to which he added the occupation of shoemaking. He gave a classical education to his son John, who graduated at Harvard in 1755. In 1764 he married Abigail Smith, a daughter of the minister of Weymouth. He took part in the measures against the Stamp Act, and was prominent in all the steps which brought about the war of the Revolution. He was one of the five delegates from Massachusetts to the congress which met in Philadelphia in 1774, and also a member of the Continental Congress of 1775. Here, with Lee and Jefferson, he boldly advocated separation from the mother country. Of the three committees appointed, on the Declaration of Independence, on a confederation and on foreign relations, Adams was a member of the first and third. The Declaration of Independence was drawn up by Jefferson, but on Adams devolved the task of battling it through Congress in a three-days' debate. The plan of a treaty reported by the third committee was drawn up by Adams. The preparation of articles of war for the government of the army was given to Adams and Jefferson, but Jefferson left the task to Adams, who drew up the articles and argued them through Congress. Thus occupied for nearly two years he gained the reputation "of having the clearest head and firmest heart of any man in Congress." In 1777 he was appointed a commissioner to France; in 1779 he was appointed minister to treat with Great Britain for peace and commerce; and in 1782 he helped in settling the conditions of peace with England. In 1789 he was the first ambassador of the United States to Great Britain. When George III expressed his pleasure in receiving an ambassador who had no prejudices in favor of France, the enemy of the English Crown, Adams replied: "I have no prejudices but in favor of my native land." On his return to the United States he was elected Vice-president, and in 1797, was made President. In 1801 his opponent, Jefferson, was elected by a majority of one in the electoral college. Adams died July 4, 1826, on the fiftieth anniversary of the independence of the United States. See Morse's *Life*, in *American Statesmen Series*.



JOHN Q. ADAMS

Ad'ams, John Quincy, sixth President of the United States and eldest son of John Adams, was born July 11, 1767, at Braintree, Mass. He graduated at Harvard College in 1788. Washington appointed him minister to The Hague in 1794, and later on minister to Portugal, but his father, becoming President, changed his destination to Berlin. In this promotion of his own son John Adams acted on the written advice of Washington, who said that young Adams was the ablest person in the American diplomatic service, and merited promotion ought not to be withheld from him because he was the son of the President. He soon became a leader of the Federal party, but separated from them on the question of the embargo. He was sent as minister to Russia and to England by Madison. He was secretary of state under Monroe. In the presidential contest of 1824 he was the cadidate of the Whig party. As no one of the candidates secured a majority of the electors chosen by the states the election went to the House of Representatives, where Adams was chosen. His administration was marked by few events of importance, though it was a period of general progress and prosperity. In 1830 he was elected to Congress, where he continued to represent his district until his death. Here he rendered perhaps the most important service in his political life, becoming conspicuous and influential in shaping tariff legislation, in arguing for the right of petition to Congress and in organizing and leading the opposition to slavery. He was stricken with paralysis while occupying his seat in the House of Representatives, and died Feb. 23, 1848. See Morse's *Life*, in *American Statesmen Series*.

Adams, Maude, an American actress (real name Kiskadden), was born Nov. 11, 1872, in Salt Lake City, Utah. Her mother was the leading woman in a stock company and while going to school Miss Adams often appeared on the stage in child's parts. At sixteen she joined E. H. Sothern's Company in New York in the "Midnight Bell." She has been connected with Charles Frohman's stock company and has supported John Drew. Her most pronounced success has been in J. M. Barrie's plays, and especially in "The Little Minister." During the winter of 1906-07 she made a great success in New York in the play "Peter Pan."

Ad'ams, Samuel, was born at Boston, Sept. 27, 1722. He was prominent in Massachusetts in the revolutionary period, and helped very much to mould public opinion and to strengthen his fellow-citizens in their determination staunchly to uphold their rights. He got up town meetings, wrote the protest which Boston made against the Stamp Act, was a leader in debate, and so formidable an opponent that attempts were made by the English party to buy his support. He was a member of the Continental Congress, a signer of the Declaration of Independence and, after the war, governor of Massachusetts. He died at Boston, Oct. 2, 1803. See Hosmer's *Life* in *American Statesmen Series*.

Adams, Wm. Taylor, better known as "Oliver Optic" (1822–1897), was a native of Massachusetts, a school teacher in Boston, and a popular writer of tales for the young. Among the best known of his works, of which he is said to have written over 100, are the *Starry Flag Series*, and *Young America Abroad*.

Addams, (Miss) Jane, a philanthropist and social settlement worker, born in Cedarville, Ill., Sept. 6, 1860. She graduated from Rockford College in 1881, studied two years in Europe, 1883-85, and later studied in Philadelphia. In 1889 she opened in Chicago a social settlement, Hull House, which became under her direction the most famous institution of its kind in the United States. Miss Addams was a frequent speaker and writer on social problems, such as housing of the poor and child welfare. She led in the woman suffrage movement, and was one of the organizers of the Progressive party in 1912. She won a world-wide reputation as an advocate of international peace. Among her books are *Democracy and Social Ethics*, *Newer Ideals of Peace*, *The Spirit of Youth and the City Streets*, and her autobiography, *Twenty Years at Hull House*.

Adder. See VIPER.

Adder's-Tongue, or dog-tooth violet, is a wild flower fond of brookside and moist wood. It belongs to the lily family, is called by many a child the "yellow lily." The plant has two lance-shaped spotted leaves, bears but a single blossom. The flower will turn on its stalk to follow the sun. Its name is not considered appropriate; change to fawn lily has been suggested, also to trout lily. It is one of the earliest spring flowers. From Nova Scotia to Florida it is found, and west to the Mississippi. The white adder's-tongue is more common in the west than in the east.

Ad'dison, Joseph, a great English essayist, was born in 1672, graduated at Oxford, and held for some years a fellowship at the University. Here some of his early writings brought him into notice and secured him a pension of $1,500 a year. Gaining this, he traveled on the continent, observing, studying and writing. In the winter of 1701, amid the stoppages and discomforts of a journey across Mt. Cenis, he composed his *Letter from Italy*, which contains many fine touches of description and is by far the best of his poems. At the death of King William his pension was stopped, and having no means of his own his prospects were gloomy indeed, till a lucky chance put him on his feet again. The ministry desired a poem written in praise of Marlborough, who had just won the battle of Blenheim. Addison wrote the poem, *The Campaign*, and was rewarded with the office of excise commissioner. He held other public offices, which kept him from writing much for the next six years. In 1710 he began to bring out his famous essays. These he contributed to the *Tattler*, next to the *Spectator* and afterwards to the *Guardian*, which he published in conjunction with his friend Richard Steele. The most successful of these periodicals was the *Spectator*. It was a daily paper, but without any news. It took the fancy of Londoners at the time, and though it only ran a few months has been renowned ever since. Addision died in 1719. See Courthope's *Addison*, in *English Men of Letters Series*.

Address, Forms of, the titles or ceremonious terms to be used in addressing written communications to people of high or official position. Usage in this country has sanctioned the employment of the following modes of address: *His Excellency, The President of the United States*. Custom has also made proper the use of the prefix *His Excellency* when addressing governors of states and ambassadors or ministers of the United States abroad. In conversation, or in formal oral address, the term *Mr. President* is used by all to the head of the nation, save by the President's personal or intimate friends. The Vice-president is addressed by letter as *The Honorable, The Vice-president of the United States*, or *The Hon. —— ——, Vice-president of the United States*. When the latter is acting as *ex-officio* presiding officer of the Senate he is addressed by the senators as *Mr. President*. Cabinet officers, senators and representatives of the United States, judges of state and federal courts and consuls are all entitled to the prefix *Honorable*, as *The Hon. Senator A. B. Clark; The Hon. Mr. Justice*, or *The Hon. Judge Jones*. Custom also permits the use of *Honorable* to mayors of cities, as *The Hon. Mayor Smith*, or *The Hon. Lionel Smith, Mayor* of the city of ——.

For church dignitaries the terms of address vary somewhat with the denomination. In the Protestant Episcopal church the bishop is addressed *The Right Rev.* ——; in the Methodist Church as *The Rev. Bishop* ——. Clergymen take the title *The Rev.* or simply *Rev.*, adding any collegiate degrees to which they may be entitled, such as M.A., D.D., LL.D., etc., or in the case of a clergyman who has a doctorate degree he may be addressed simply: *The Rev. Dr.* ——. It is bad form, it may be added, to speak or write of a clergyman as *Rev. Jones, Rev. Smith*, etc. If his Christian name is not known, use invariably the prefix *Mr.* (Mister), as the *Rev. Mr. Jones*, etc. Archbishops are addressed: *The Most Rev.* —— ——, D.D. (or whatever degree possessed of); while cardinals are addressed *His Eminence* —— ——. Physicians and surgeons are addressed: *Dr.* —— ——, or *Thomas Jones, Esq., M.D.* Lawyers or private gentlemen may be addressed either —— ——, *Esq.*, or plain *Mr.* —— ——.

Where husband and wife are both addressed, it is proper to give the title of the former, followed by the word Mrs., using the given name or initials of the husband; thus: *His Excellency, the President, and Mrs. McKinley; Governor and Mrs. Jonas Smith;* or *The Hon. and Mrs. J. L. Jones.* In the case of scholastic titles or those conferred by universities they usually precede the name, thus: *Prof.* Harry Jones; *Dr.* Walker Brown, or may follow the name, thus: Goldwin Smith, Esq., *D.C.L.* (Doctor of Civil Law), or —— ——, Esq., *LL.D.* (Doctor of Laws).

Ade, George, humorous writer and playwright, was born at Kentland, Indiana, in 1866. He was educated at Purdue University and did newspaper work in Chicago, where his *Stories of the Streets of the Town* brought him into notice. His *Fables in Slang*, two volumes appearing in 1901-02, gave him wide reputation for pungent and satirical wit. His musical comedies, *The Sultan of Sulu* and *Peggy from Paris*, appeared in 1903. Later works are *The County Chairman, The College Widow* and others.

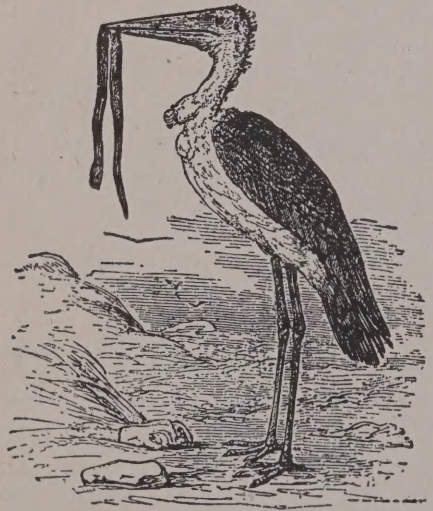
Adelaide (*ad'e-lād*), situated about six miles from St. Vincent's Gulf, is the capital of South Australia. The Torrens River divides it into North and South Adelaide. It is surrounded by hills, has large manufactories, and exports especially copper and gold. It is the seat of the University of Adelaide, incorporated in 1874, and authorized to grant degrees in arts, law, music, medicine and science. Port Adelaide, at the mouth of the river, is the principal port of South Australia. Population, with suburbs, 184,393.

A'den, a British Protectorate on the Arabian Coast, about 100 miles east of the Straits of Bab-el-Mandeb, at the southern entrance to the Red Sea. Besides the town and port, which are strongly fortified and are used as an important coaling station for British vessels on the way to India *via* the Suez Canal and the Red Sea, the region embraces a protectorate, consisting of a large section of the Arabian hinterland (area, about 9,000 square miles), arranged in 1905 by Commissioners of the Ottoman and British Governments. This protectorate, which includes Aden, the Island of Perim and the Aden Hinterland, is administered by a political resident of the British Government and made subject to the Government of Bombay, India. Its population is now 46,165. Its trade is almost purely a transhipment one, except that from the interior of Arabia, which consists of coffee, gums hides and skins. The peninsula on which Aden stands is volcanic. The climate is quite healthful though there is little rainfall. This is unfavorable to agriculture, which, it may be said, hardly exists. In early days Aden was used by the Romans as an entrepot for the empire's trade with the east. Subsequently it came under Portuguese and Ottoman rule, and in 1839 it was taken from the Turks by Britain.

Adirondacks (*ăd-ĭ-rŏn-dăks*), a group of mountains in northern New York, lying between Lakes Champlain and Ontario. They rise from a large tableland to about 2,000 feet above the level of the sea, and are chiefly of granite formation. Mt. Marcy, the highest summit, is 5,370 feet high. The forests, especially the white pine, are very valuable. The scenery and abundant game of these mountains have made the region a popular resort for tourists and sportsmen. The state of New York has constituted a forest reserve or park in this district, comprising 2,807,760 acres, an area larger than the state of Connecticut. A large force of men is employed to guard against forest fires, enforce the law against illegal fishing and hunting, and to act as guides. A sanitarium for the treatment of consumptive patients is located at Saranac Lake.

Ad' jective (Latin *ad+jacere*, to add to; to throw out), is a word used in grammar to describe, qualify or limit the meaning of a noun or a pronoun; as a wise man, a good book, a lovely flower, a true story, a happy child, a weariful day. These are called descriptive adjectives, since they express some property or quality possessed by the noun. There are also limiting adjectives used to express number or quality, such as the indefinite article *a* or *an*, and the definite article the, this, one, first, some, much, etc. Not a few of these are used like pronouns, and are termed adjective pronouns; some of these are: all, any, each, few, many, such, several, etc. Descriptive adjectives are sometimes, by ellipsis, used as nouns; so used, the adjective when it denotes persons is taken in the plural sense, and is usually preceded by *the*, as "The poor deserve sympathy." Adjectives are used comparatively, when we desire to indicate that one thing possesses a given quality in a higher degree than another. There are three degrees of comparison—the positive, the comparative and the superlative, as exemplified thus; sweet (positive), sweeter (comparative), and sweetest (superlative). Other examples are, tall, short, warm, cold, great, small, rare, fine, etc.—the comparative being expressed by adding *er* and the superlative by adding *est* to the positive. Degrees of quality are also expressed by prefixing to the positive the adverbs *more* and *most*, *less* and *least*—as cheerful, more cheerful, most cheerful; amiable, less amiable, least amiable. When two qualities in the same person or thing are compared, or when the adjective we want to use follows its noun, the following is the mode of usage: He is more wise than honest. In the English and German languages the usual place of the adjective when it is not in the predicate is before the noun. For examples of phrase-adjectives and other uses of the adjective see any good textbook on grammar.

Ad′ jutant, a large stork found in tropical India, by the English given the soldier name because of its erect attitude and solemn manner of stalking about. *Argala* is the native name. It is of great size, sometimes six feet high and fourteen feet in expanse of wings. Its beak is very large; it sometimes catches crows and other birds on the wing, and is able to swallow a kitten, fowl or leg of mutton, but its usual food is offal, lizards, etc. It frequents the neighborhood of slaughter-houses and the burning-grounds of the Hindus. It is so useful as a scavenger that in some places in India it is protected by law. It is greenish-black above and white below. The head and neck are bare or provided with a few scattered hairs, the legs long and naked. At the lower part of the neck is a peculiar air-pouch which is also bare; it is inflated during flight. The beautiful marabou feathers used in trimming ladies' hats come from the tail of the adjutant and also from the closely related marabou stork of Africa. The adjutant's note is a peculiar grunting croak or bellow.



ADJUTANT-BIRD

Ad′ ler, Felix, writer and lecturer, the son of a Hebrew rabbi, was born at Abzey, Germany, in 1851. His education has been chiefly American, but he is a Ph.D. of Berlin University. In 1874–6 he was professor of oriental languages and Hebrew at Cornell University. This post he resigned to lecture before the Ethical Culture Society. His lectures before this society on Sundays in New York are well known and attended. Dr. Adler was called in 1902 to be professor of social and political ethics in Columbia University. He is the author of *Creed and Deed* (1878) and *The Moral Instruction of Children* (1892).

Ad′oles′cence. The word adolescence is used to designate the period of transition from childhood to adult life. It is the period beginning just before puberty, and lasting till the age of maturity. It may be conveniently divided into two stages: (1) that of *early adolescence or pubescence*, beginning at the age of eleven or twelve in girls, and thirteen or fourteen in boys, and lasting till about the age of sixteen or eighteen; (2) that of *late adolescence*, from sixteen to twenty-one in girls and eighteen to twenty-five in boys.

There is, of course, continuity throughout the whole development of an individual, and lines of demarkation cannot be too rigidly drawn, or characteristics of special periods too strongly emphasized, particularly as the nature of development varies considerably with different persons; but there are certain well marked features of adolescence with which teachers and parents as well as adolescents themselves should be familiar.

After the somewhat slow period of growth of later childhood there is, at the beginning of pubescence, a sudden shooting up in height, closely followed by a rapid increase in weight. In both boys and girls the body now begins to assume the adult form, and the pronounced sex differences appear. In boys the beard begins to grow, and the voice changes and deepens, the rapid growth of the larynx making accurate control of the vocal organs for a time impossible. Boys often exhibit, and are sensitive to, awkwardness in the management of their overgrown bodies. Latent capacities and interests develop, the features change to show new characters, and hereditary influences become more pronounced.

The essential characteristic of pubescence is, of course, the unfoldment of the functions pertaining to sex, with their accompanying instincts and impulses. The youth suddenly finds himself strangely sensitive to the charms of the opposite sex and strongly susceptible to its influence. A new interest in dress and the care of the person usually develops, and often a tendency to show off, on account of the newly awakened regard for the good opinion of persons of the opposite sex. These sex instincts, like all other instincts, should be properly directed, strengthened or inhibited in view of their future function on the one hand and the danger of perversion on the other.

The more distinctly mental and emotional traits of this period are, perhaps, more variable than the physical ones, but scarcely less pronounced. In thought and feeling, as well as in appearance, the boy becomes specifically masculine and the girl feminine. It is a time of great increase in mental and emotional vigor, of tremendous enlargement of the sphere of interests and broadening of the mental horizon. The beauties of nature, of poetry and of art begin to appeal, and the soul can be profoundly stirred by religious and ideal sentiments. The youth comes to look upon himself in the light of his larger relations to the race and to society, and to attempt a personal readjustment to the larger view of life thus opened up. Intellectually he becomes capable of comprehending broader generalizations and larger thoughts. In many it is an epoch marked by great emotional instability. Periods of enthusiastic energy and noble attempt at high achievement often alternate with periods of languor, depression and doubt.

The stage here gradually shades off into that of late adolescence. Late adolescence is essentially a time of fixing the framework of the personal habits, ideals and relationships of life. It is normally a time of choosing a life profession and of taking the initial steps toward entering upon it. It marks the transition from a state of dependence upon others in matters material and intellectual to one of independence, showing itself in the development of a characteristic personality capable of thinking and acting as such. Outbreaks against restraint and authority often seem to occur almost instinctively at this period and should be dealt with sympathetically by parents and teachers. Much needless and harmful friction and misunderstanding are caused by the failure of adults to comprehend the real nature and cause of these outbreaks. In many this emerging personality is subject in turn to periods of emotional exaltation of self-consciousness with abundance of self-confidence, and periods of distressing depression and doubt, with feelings of total inability to cope with the complexity of the problems opened up by this wondrous new birth.

With some, this ebb and flow of feelings connected with the emergence of the new sense of one's distinctive personality give rise to a great deal of needless anxiety. Largely on this account later adolescence has been called a stress and strain period. Those who do not manifest this extreme emotional instability are fortunate. Those who do should be led to see that these feelings in themselves are of no consequence, but merely accidental accompaniments of certain physiological changes, and that vague fears for the future are groundless and harmful.

Professor James' words of encouragement in this connection have been so inestimably helpful to many adolescents that they are here quoted at length: "Let no youth have any anxiety about the upshot of his education, whatever the line of it may be. If he keeps faithfully busy each hour of the working day he may safely leave the final result to itself. He can, with perfect certainty count on waking up some fine morning to find himself one of the competent ones of his generation in whatever pursuit he has singled out. Young people should know this truth in advance. The ignorance of it has engendered more faint-heartedness in youths embarking upon arduous careers than all other causes put together."

The practical problem for the educator during the whole period of adolescence is to recognize the new interests, emotions and impulses as they emerge, and to provide for them suitable outlet in action. The confidence that later adolescents are willing to repose in sympathetic adults who understand their needs and the longing that they feel for adequate counsel and adult companionship render them peculiarly susceptible to wise guidance, and make possible at every stage a gradual transition—an evolution rather than a catastrophic revolution, as is too often the case.

B. R. Simpson.

Adolph'ustown, a town in Prince Edward County (north shore of Lake Ontario), in Eastern Ontario. The United Empire Loyalists first landed at this point June 16, 1784. To commemorate this event an important centennial celebration was held at Adolphustown in June, 1884, at which were present the Lieutenant Governor of the Province (John Beverley Robinson), and other notables. The settlement of Upper Canada (now Ontario) began in 1784 by the arrival of the Loyalists. When the American colonies revolted in 1776 and declared their independence many of the colonists opposed the movement and aided the imperial troops during the war. These were known as the United Empire Loyalists. The war being over, many of them moved and made their homes in the territory known as New Brunswick and Nova Scotia. Others crossed the Niagara River, or settled on tracts along the St. Lawrence. A considerable part of the present population of Ontario is descended from these pioneers. In 1784 the total white population of the Province of Ontario did not exceed 20,000.

Adonis (*a-dō'nis*), a very beautiful youth celebrated in Greek mythology. The goddess Venus loved him for his beauty, and hid him in a chest, which she intrusted to Proserpine, the goddess of the lower world. A dispute arose between them for his possession, and Jupiter decided that each should enjoy his presence for half the year. Adonis was fond of hunting, and was finally killed by a wild boar in the forests of Ida. The bitter lament of Venus for his loss moved the gods to permit the youth to return to the upper world for six months in every year. A yearly festival in honor of Adonis was given in the countries bordering on the Mediterranean, and consisted of two parts—a mourning for his departure to the underworld, and a rejoicing for his return to Venus. Adonis is believed to be the sun, and his stay in the upper and lower worlds to represent the changes of winter and summer.

Adrenalin, a secretion of the adrenal glands above the kidneys; a powerful heart stimulant frequently injected into the heart in cases of stoppage of that organ during surgical operations.

Adrian (*ā'drĭ-an*), the name of six popes. Adrian IV, the only English pope, was named Nicholas Breakspeare. He left England a poor man, went to Paris, became an ardent student, and was soon known for his learning and zeal. He was chosen abbot, then cardinal, and lastly pope in 1154. He was vigorous in maintaining his authority at Rome and throughout Europe. He died in Italy in 1159.

Adrian, a city, the county seat of Lenawee County, Mich., on the Raisin River, and on the New York Central, Wabash, Detroit, Toledo and Ironton Railways, thirty-two miles from Toledo, Ohio, and sixty miles southwest of Detroit. It is the seat of Adrian College (Meth. Prot.), the State Industrial Home for Girls, and St. Joseph's (R. C.) Hospital and Academy. It has a considerable agricultural trade and many important manufactures, woven wire fence, underwear, piano and organ factories, steel and electrical works, four banks and daily and weekly newspapers. Population, 13,000.

Adriano'ple (*ăd-ri-an-ō'pl*), meaning the city of Hadrian, is a city of European Turkey. It is next to Constantinople in importance, though not in population. The streets are narrow, crooked and filthy; its ancient citadel and the walls which formerly surrounded the town are now in ruins. It was called Uskadama till renamed by the Emperor Hadrian. In 1360 it was captured by the Turks, who made it their capital for almost a hundred years, or until they came into possession of Constantinople. It has also been twice taken by the Russians, and in 1912 by the Balkan Allies. Population 83,000.

Adriatic (*a-dri-ăt'ik*) **Sea,** is an arm of the Mediterranean, which separates Italy from Trieste, Croatia, Dalmatia and Albania. Its greatest length is 450 miles and its mean breadth 90 miles. The Po is the most important river flowing into the Adriatic Sea, and the chief cities bordering it are Venice, Trieste, Ancona and Brindisi. In 1177 Venice gained a victory on the Adriatic over Otho, the son of Frederick Barbarossa, whereupon the pope gave the doge a ring and instituted the famous ceremony of marrying the Adriatic.

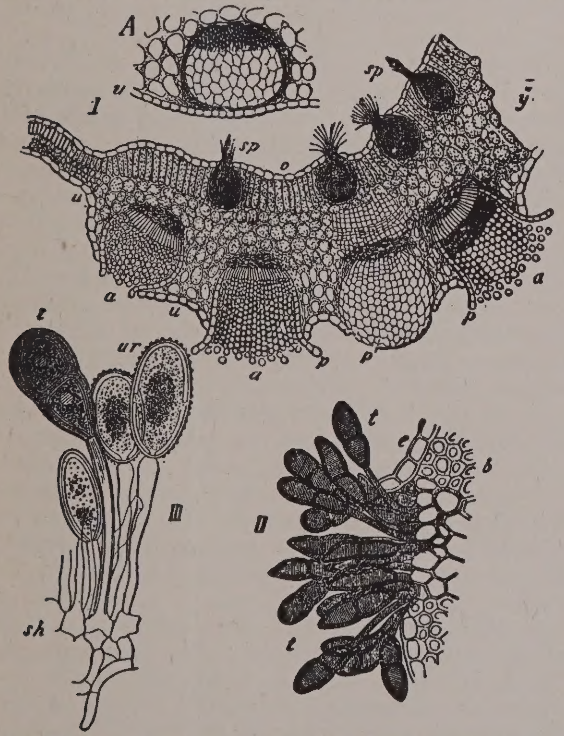
Adul'tera'tion of Foods, any changing of a food for the purpose of deceiving the purchaser. The term includes, for example, the mixing of cheaper substances with the food so as to increase the amount of profit from its sale, the mixing in of preservatives and materials calculated to improve the appearance of partly spoiled food, the extraction of cream from milk, etc.

The practice is, no doubt, as old as trade, and has frequently been legislated against by all civilized countries. At the present time the laws against it throughout the greater part of Europe are stringent and usually enforced. The laws in the United States concerning adulteration are carefully drawn, but it has not always been possible to enforce them. In 1907, a law of national scope was enacted, which requires that the wrapper of any food shall have upon it a statement of the exact contents, including preservatives.

Ad'verb (Latin *adverbium*, from *ad*, to, +*verbum*, word, verb). In grammar, an adverb is a word used to modify the meaning of a verb, an adjective or another adverb. It is essentially "the word" of a sentence, and has a number of functions, in showing how, where and when a given action is performed, besides its general use as a modifier. Adverbs are classed as follows: (1) those of place, used in answering the questions Where? Whence? Whither? Of these the following are some examples: here, there, when, forth, far, etc; (2) those of time, answering questions When? How often? How long? Ex: once, ago, always, seldom, now, then, etc.; (3) those of manner, answering the question How? Ex: then, so, how, well, fast, chiefly, wholly, slowly, etc. Many of this class are derived from adjectives by adding *ly;* (4) those of degree, answering the question How much? Ex: less, least, enough, more, most, scarcely, etc.; (5) those of cause, answering the question Why? Ex: hence, wherefore, therefore, consequently, accordingly, etc. When used to ask questions, these adverbs of the various classes are termed interrogative adverbs. The words soon, away, sometimes, often, are used *only* as adverbs; while other words, such as early, late, fast, etc., are sometimes adverbs and sometimes adjectives, according as we use them. Many adjectives become adverbs by adding *ly*, as violent, violently, swift, swiftly, slow, slowly, etc. A few adverbs, like adjectives, are compared, such as soon, sooner, soonest; often, oftener, oftenest; long, longer, longest, etc.; some also are compared by the use of the adverbs more and most, less and least. Ex: wickedly, more wickedly, most wickedly; quickly, less quickly, least quickly. For other details and examples in the use of adverbs see any good text-book on grammar.

Æcidiomycetes (*ē-sĭd′ĭ-ō-mī-se′-tēz*), the technical name of a large group of plants commonly known as "rusts" and "smuts." They are very destructive parasites and attack some of the most valuable crops. The rusts chiefly attack the leaves of the higher plants, producing rusty lines and dots; while the smuts chiefly prey upon the grasses and are very injurious to cereals, attacking the grains of wheat, corn, oats, barley, etc. These parasites are very polymorphic, that is they assume different forms at different periods in their life histories, and these different phases have often been described as different kinds of plants. The history of these parasites is often further complicated by the fact that in their different phases they may live on different plants (hosts). Great attention has been paid to these destructive forms by the national and state governments, in the hope that some way may be discovered by which their destructiveness may be lessened. The wheat rust is one of the best known forms, and its life history may serve as an illustration of the whole group. When the wheat is growing, rusty lines and dots appear on the leaves and stalk. These spots are known as the "red rust," and are masses of spores which have come to the surface, and are called "summer spores" or "uredospores." (III *ur.*) They arise from the threadlike body or "mycelium" of the parasite, which is imbedded out of sight among living cells of the wheat body and is feeding upon them. These summer spores are easily scattered by the wind, and falling upon other wheat plants germinate, enter the body. and begin to feed upon it. By means of the summer spores, therefore, the rust disease is spread rapidly during the growing season. In the late summer and fall black lines and dots appear upon the wheat stubble, forming the so-called "black rust," being masses of peculiar spores called "teleutospores" or "winter spores," because they last through the winter. (II, *t.*) These teleutospores come from the same mycelium (white threads) which produced the summer spores, and are the last spores it produces. Early the following spring the teleutospores germinate and form a little filament which produces very minute spores called "sporidia." These sporidia are scattered by the wind, and falling upon barberry leaves they germinate, the mycelium entering the leaf. This new mycelium sends to the surface of the leaf, especially the under surface, masses of orange-colored spores in little cup-like clusters, which are called "cluster-cups," or each is technically called an "æcidium." (I, *a.*) These æcidium spores from the barberry are carried by the wind to the young wheat, where they germinate and produce the mycelium with which we started. In case the barberry is not present to be used as a host for the æcidium stage this stage is omitted, and the sporidia pass directly to the wheat and germinate. There are thus three distinct phases in the life history of this plant, at least four kinds of spores, and two host plants, the sporidium phase not being a parasite. See Fungi.

John M. Coulter.



Phases of wheat rust: (I) cluster-cups on barberry (lower side); (II) winter spores (teleutospores) on wheat; (III) summer spores (uredospores) on wheat.

Æcidium (*ē-sĭd′ĭŭm*). See Æcidiomycetes.

Ægean (*ē-jē′ăn*) **Sea,** an arm of the Mediterranean between Greece and Asia Minor, is now called the Grecian Archipelago. One fable traces its name to Ægeas, king of Athens, who threw himself into its waters. It is over 400 miles in length, with an average breadth of 200 miles. It is studded with islands, many of which have played an important part in Grecian history.

Æneas (*ē-nē′ăs*), a Trojan warrior and hero of the *Æneid*, the great epic poem of

Vergil; the son of Anchises and the goddess Venus he married Creusa, the daughter of King Priam. After the sack of Troy he left the city, carrying his father on his shoulders and leading his son Ascanius. Building a fleet, he set sail with a few chosen companions, but was shipwrecked on the coast of Africa, near Carthage. He was received kindly by Queen Dido, whom he would have married had he not been warned by the gods to seek Italy. On setting out thither, his ship, as it left port, was lighted by the funeral pyre of Dido, who had killed herself in grief at his departure. After celebrating the national games on the coast of Sicily in honor of Anchises, who had died there, and paying a visit to the lower world, where the future was unfolded to him, Æneas reached the Tiber. He was received by King Latinus, whose daughter he married. He fell in battle with the Etruscans, and after his death received the honors of a god. His son Ascanius or Iulus founded Alba Longa, one of whose kings, Numitor, was the grandfather of Romulus, who founded Rome. Hence the Romans claimed to derive their origin from Æneas.

Æolian (*ē-ō'lĭ-an*) **Harp,** a musical instrument named from Æolus, god of the winds. It is made by stretching catgut strings or wires over a thin sounding box. The strings are tuned as in a violin. When placed in a partially closed window, where there is a draught, the passing of the wind over its strings produces strange and melancholy musical sounds, varying with the force of the wind.

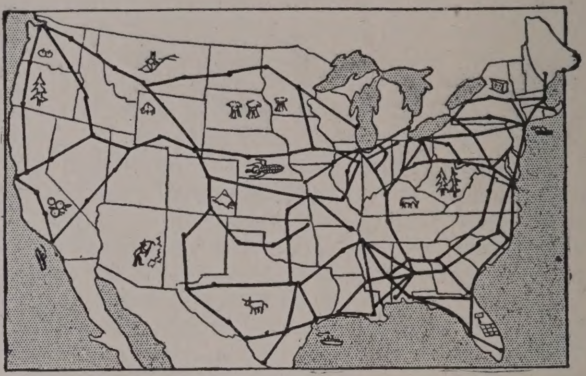
Æolus (*ē'ō-lus*), the mythical god of the winds. He is said to have ruled over the Æolian islands, now the Lipari group, in the Tyrrhenian sea. Here he kept the winds shut up in a cave, loosing them and calling them back at the command of Neptune.

Aeronautics (*ā-er-o-naw'tiks*) or **Aerial Navigation.** Probably since men first looked at the eagle soaring aloft, and wild geese winging their way between the far ends of the earth, mankind has envied the bird's power of flight, and sought to win this power for itself. The story of Daedalus (*q. v.*) shows that the idea was alive among the ancient Greeks. Leonardo da Vinci, the master-mind of the Italian Renaissance, designed many flying machines, and one of his helpers was saved from death by falling into a rubbish heap when he launched himself from a roof in one of his master's devices, nevertheless the idea persisted, in spite of defeat and discouragement, until June 5, 1783, when man for the first time succeeded in launching a flying device, other than a kite, into the air.

This first triumph was success in soaring, but not in true flight. The brothers Stephen and Joseph Montgolfier, paper-makers of Annonay, France, demonstrated that heated air, or "smoke," imprisoned in a paper bag, would carry the bag upward. Later animals and finally men went up with the soaring bags, and thus the balloon came into being.

DEVELOPING THE BALLOON

Once the idea was proved sound, balloons of this soaring type were rapidly brought into their present form. Cloth was substituted for paper in the bag, and a light gas, such as hydrogen, for heated air. During the World War, the United States developed methods for obtaining the light, noninflammable gas helium in great quantities, this being the only notable change in the art of ballooning in recent years.



NETWORK OF U. S. AIR MAIL ROUTES

The great area of the United States has made the use of airplanes for carrying mail a most useful service. In Europe, the density of population has brought about a network of commercial, passenger and mail routes more finely woven than in the United States

These soaring balloons were used in two ways. The *captive balloon* was allowed to rise, but was held to the vicinity by an anchoring rope. It was used to some extent for military observation during the 19th century. The *free balloon* was sent up to go wherever the winds might take it. The spherical captive balloon was not particularly useful, because it spun badly; but when the body was changed to a sausage shape, and one end was weighted with a cluster of small bags or *balloonets* containing air, it rode steadily with the upper end pointed into the wind. In this form, known as the *drachen*, or kite balloon, the captive balloon was used extensively in the World War.

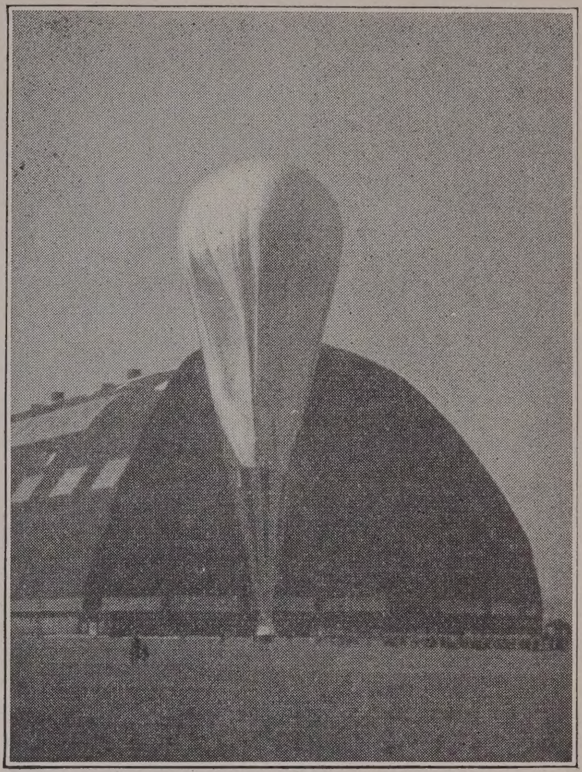
A still more recent development is the balloon built to ascend into the stratosphere. The first flight of this kind was made by Professor Auguste Piccard, a native of Switzerland and physicist at the University of Brussels, and his assistant, Mr. Charles Kipfer. The ascension was made on May 27, 1931, from Augsburg, Bavaria. Sealed in an airtight aluminum ball, the two scientists spent eighteen hours and thirteen minutes in the air. The balloon came to earth on a glacier near the village of Ober Gurgl, Austrian Tyrol. The aluminum ball was seven feet in diameter. The two scientific adventurers were hermetically sealed in the ball with an artificial supply of hydrogen. This made it possible for them to maintain reasonable comfort at an altitude that would mean certain death to the ordinary balloonist or aviator. The bag of the balloon was 100 feet in diameter and had a gas capacity of 500,000 feet. The balloon rose to a height of 51,793 feet, and tests and experiments were made in regard to cosmic rays and other mysteries of our upper atmosphere.

Professor Piccard made a second visit to the stratosphere in 1932. Accompanied by another assistant, Max Cosyns, he left the earth on August 18 at Dubendorf, near Zurich, Switzerland. After having been in the air for twelve hours, the balloon came safely to earth in a field near Desenzano, Italy. On this occasion the scientists achieved an altitude of 17,000 meters (55,774 feet). This was 16,000 feet above the lower level of the stratosphere, and more than twice the height of the Himalaya Mountains.

In 1933 three stratosphere flights were undertaken. At A Century of Progress Exposition, Chicago, Lieutenant Commander T. G. W. Settle, famous balloonist of the United States Navy, attempted a flight. The balloon rose about a mile, but due to the sticking of a valve was forced down. Settle was aided in the preparations for the flight by Jean Piccard, noted chemist and twin brother of Professor Auguste Piccard. On September 30, 1933, a stratosphere flight was undertaken in Soviet Russia. Three men in an aluminum ball hooked to a balloon ascended 11.8 miles above the earth's surface. The leader of the exposition was Ernest Birnbaum, and he was accompanied by Georgi Prokofiev and Konstantin Gudenoff. The balloon, *Stratostat U. S. S. R.*, was in the air eight hours and nineteen minutes. Instruments carried by the balloon indicated it had reached a height of 19,000 meters, as compared with the record of 16,700 achieved by Professor Piccard in 1932.

The fourth ascension to be made into the stratosphere occurred in the United States. On November 20, 1933, Lieutenant-Commander T. G. W. Settle of the U. S. Navy, and Major Chester L. Fordney of the U. S. Marine Corps, ascended from Akron, Ohio. An official altitude of 61,237 feet was attained. This exceeds by some 8,000 feet the height reached by Professor Auguste Piccard and Max Cosyns in 1932, which had stood as the official altitude record. The record of 62,304 feet claimed by the three Russian aeronauts was never officially recognized, as the U. S. S. R. is not a member of the *Federation Aeronautique Internationale.* The two Americans brought their balloon safely to land in a swamp near Bridgeton, New Jersey. They pronounced their cosmic ray investigations a "complete success" from the mechanical standpoint.

One of the things which the stratosphere holds out is the possibility of terrific speeds in aviation. Scientists are convinced that at stratosphere levels, airplanes can travel 500 miles an hour with ease. Wiley Post, who flew the *Winnie Mae* around the world, came back to New York enthusiastic over the possibilities of high speed in the higher altitudes. In his opinion, the circumnavigation of the globe need not take over two days time, if accomplished at stratosphere levels.



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TAKING OFF FOR THE STRATOSPHERE

Attendants at the Goodyear-Zeppelin airdock, Akron, Ohio, may be seen struggling to hold the straining balloon, in which shortly afterward, Lieut. Com. T. G. W. Settle and Maj. C. H. Fordney soared aloft into the rarified atmosphere of the stratosphere.

DIRIGIBLES

Although the early balloons, and in fact the later ones as well, "got into the air," they could not be made to go in the direction the operator wished. Much time and thought was devoted to the problem of steering a balloon. The first experiment to meet with some success occurred in 1784. In that year the two brothers Roberts built a balloon shaped like a melon. It was filled with hydrogen and had a white wooden car hanging from it. The car was equipped with a set of six silken oars which were operated by the crew of six men. The ship was in the air for seven hours, and by working the sail-like oars the crew was able to make it navigate around a circle almost a mile and one-quarter in diameter. In the same year Francis Hopkinson wrote a letter to Benjamin Franklin suggesting the possibility of a spindle-shaped balloon which could be driven through air by a wheel-like propeller.

The first dirigible, or balloon that could be directed or steered, which was successful both in design and operation, was built by Henri Giffard of France. Captain Charles Renard, of the French War Department, continued Giffard's experiments and built the first man-carrying dirigible which was able to return to its starting point against the wind. In 1884 Renard, assisted by Captain Krebs, constructed the *La France,* a dirigible powered by storage batteries and an electric motor. In the meantime the Germans were conducting experiments with gas-driven and benzine-driven motors, which gave promise of practical success. Another, who devoted much time and money to the development of lighter-than-air craft, was Santos Dumont, a wealthy Brazilian living in Paris. In 1901 he flew around the Eiffel Tower in a cigar-shaped balloon, from which hung a frame equipped with engine, propeller and rudder.

Two types of dirigibles were developed. In one type the gas alone maintains the shape of the envelope. Any sagging or deformation cause by loss of gas is remedied by inflating internal ballonets with an air pump. In the second type a rigid frame is utilized to maintain the shape. The envelope is made of fabric or thin strips of light-weight metal, as was true in the *ZMC*-2 which was constructed in the United States in 1929. The gas is stored in a number of separate compartments, or ballonets, within the frame. In between these two kinds of dirigibles there is the semi-rigid type, which has a collapsible envelope with internal ballonets, but is strengthened by a rigid keel which runs along the lower side of the envelope.

Probably more was contributed toward the perfecting of the dirigible by Count Ferdinand von Zeppelin of Germany than by any other one man. He formed a company for the purpose of developing dirigibles in 1898, and in 1900 he brought out his first dirigible or "Zeppelin" as his ships came to be known. It was the prototype of many succeeding ships. In the ensuing ten years Count von Zeppelin had to face repeated disasters, but by 1910 he had the *Deutchsland* ready. The first trip with passengers was made on June 22, 1910. During the next three years, ten "Zeppelins" were put into service and the first commercial means of passenger air travel was established.

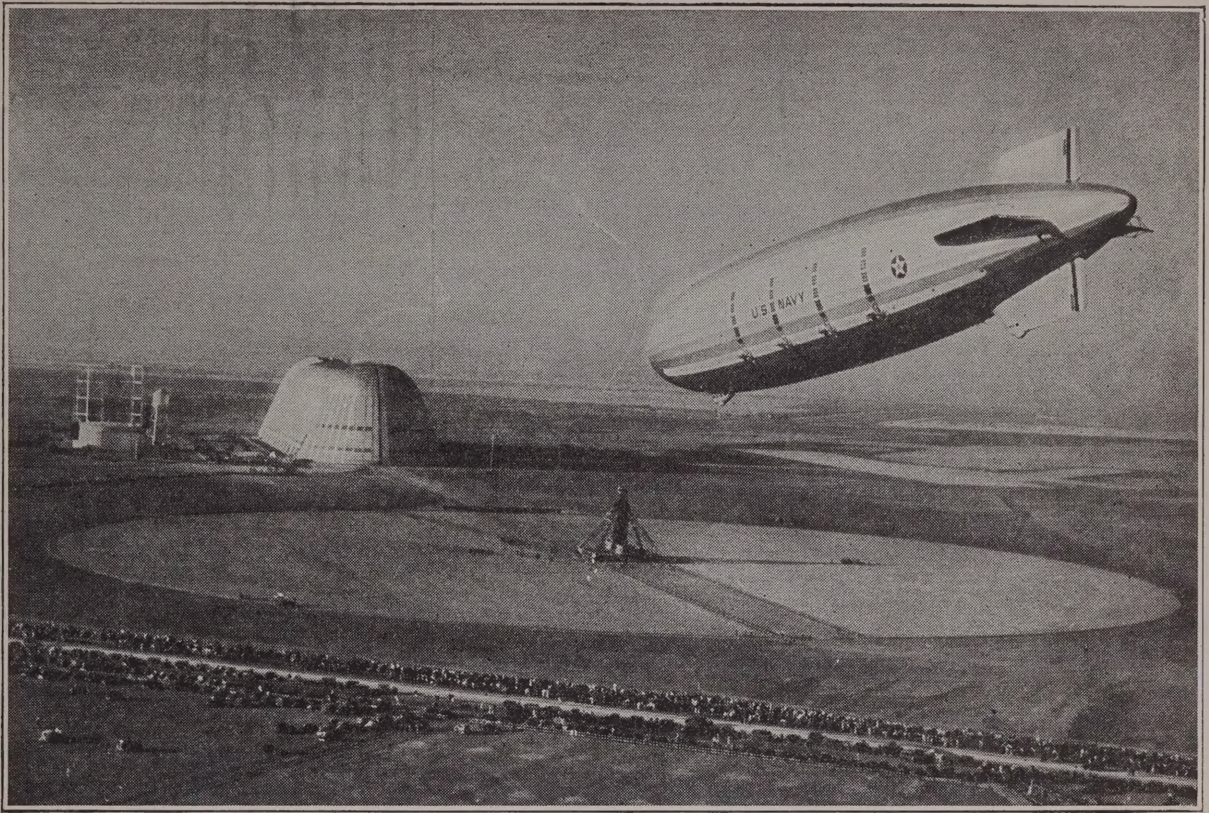
In the World War, the Germans hoped to cause much damage by the use of Zeppelin dirigibles in bombing raids on London, Paris and other cities of the Allies. While some damage was done and many defenseless people were terrorized, the general effect was not what the Germans had anticipated and on the whole the Zeppelin campaign may be termed a failure.

While Count von Zeppelin was conducting his experiments, Dr. Hugo Eckener ridiculed them as fanciful and impractical. After a bitter exchange between the two men, a meeting was arranged which led to the conversion of Eckener to Zeppelin's viewpoint and the association of the two in the further development of the great aircraft. In 1922, Eckener became general manager of the Zeppelin Construction Works and in 1928 he became the president of this organization. In 1924 Dr. Eckener built the *ZR*-3 (*Los Angeles*) and piloted it across the Atlantic Ocean to the United States. In 1928 the *Graf Zeppelin* was completed under Dr. Eckener's supervision and in October of that year made a flight from Friederichshafen, Germany, to Lakehurst, New Jersey, and return. In August, 1929, the great dirigible, after a flight to America, left Lakehurst on a flight around the world. The ship sailed east from Lakehurst on August 8 and returned from the west on August 29. Since that time more or less regular service has been maintained by the *Graf Zeppelin* between Germany and South America. In 1933 the *Graf* made a trip to A Century of Progress, Chicago.

Great Britain was for a time interested in the development of lighter-than-air craft. Two giant ships, the *R*-100 and the *R*-101 were constructed. At the time of its launching in the Autumn of 1929, the *R*-101 was the largest in the world. The *R*-100 made a flight to Canada and return, but it was not considered overly successful. On an attempted flight to India, the *R*-101 was completely destroyed on the morning of October 5, 1930. Of the fifty-three people aboard the aircraft, only seven survived. Inflated with inflammable hydrogen, the crash of the ship into a hillside not far from Bordeaux, France, was followed by a terrific explosion and fire. This terrible disaster caused the British to abandon lighter-than-air craft and concentrate their efforts on airplanes.

Italy also spent some effort in the development of dirigibles, as did France. The *Norge,* which carried the Amundsen-Ellsworth-Nobile expedition over the North Pole, was Italian built. Also the *Italia,* which carried General Umberto Nobile on his ill-fated polar trip, was built in Italy. French efforts in the development of dirigibles were slowed up after the destruction of the *Dixmude* with fifty-three people in 1923.

After the World War, the United States seriously took up the development of dirigibles. The first dirigibles owned by the United States Navy, however, were built in Europe. Several serious disasters occurred. On February 21, 1922, the *Roma* blew up over Hampton, Virginia, killing thirty-four. On September 3, 1925, a thunderstorm caused the destruction of the *Shenandoah* near Ada, Ohio; fourteen members of the crew were killed. The Goodyear-Zeppelin Corporation of Akron, Ohio, built two dirigibles for the United States Navy, beginning in 1930. The



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THE U. S. S. MACON ARRIVING AT MOFFETT FIELD, SUNNYVALE, CALIFORNIA

The largest dirigible in the world is here shown arriving at its permanent home, after a non-stop flight from Lakehurst, New Jersey. The new hangar of the West Coast Dirigible Base is to be seen to the rear of the mooring mast, and in the distance is pictured the southern end of San Francisco Bay.

Akron made its first flight on September 23, 1931. It was 785 feet long and had 6,500,000 cubic feet of lifting gas capacity. American dirigibles are inflated with helium, which will not burn. The ill-fated *Akron,* however, was destroyed in a storm on the night of April 4, 1933, and fell into the Atlantic Ocean, about sixty miles south of New York Harbor. Of the seventy-six men on board, only three survived. The "sister ship" of the *Akron,* the *U. S. S. Macon,* was officially accepted by the United States Navy on June 20, 1933, after a series of trial flights which included a visit to A Century of Progress Exposition at Chicago. The *Macon* is powered by eight motors and has compartments for five scout airplanes. The skeleton is of aluminum alloy, and the dirigible is kept afloat by 6,500,000 feet of helium gas. The ship cost $2,450,000. In October, 1933, the *Macon* made a non-stop flight from Lakehurst, New Jersey, to the naval air station at Sunnyvale, California.

AIRPLANES

Aviation is the art or science of locomotion by means of airplanes. Such an accomplishment was long sought by man. It was the dream of a thousand inventors, but the solution of the problem is an American achievement. The first airplane to fly successfully and carry a man was built by Orville and Wilbur Wright of Dayton, Ohio.

The first airplane flight in the history of the world was made at Kill Devil Hill, near Kitty Hawk, North Carolina, on December 17, 1903. After months of discouraging effort and experiment the Wright brothers at last had a machine which they thought might fly. The strange-looking device was held in place at the top of an inclined track by a wire. Orville Wright climbed into the kite-like affair. There were no wheels for it to rest on, only runners similar to those of a sled. The engine was warmed up. The propeller whirled in the stiff wind. The wire was released and the machine started sliding down the inclined plane into the wind. Wilbur Wright ran along beside the right wing, ready to balance it on the track. As the machine neared the end of the incline it lifted into the air. Twelve seconds later it settled down on the sand 120 feet away without damage. Success had been achieved; for the first time in history, man had been able to fly in a heavier-than-air machine carrying its own motive power. Three other flights were made immediately afterward. Wilbur stayed aloft for fifty-nine seconds and covered a distance of 852 feet against a twenty-mile wind. Shortly after this flight, a gust of wind upset the frail craft and wrecked it where it rested on the sands. This ended this series of experiments at Kitty Hawk on the very day of success. Thirty years later, the world's record for non-stop long-distance flight was some 5,900 miles from New York City to Rayak, Syria. In comparison these first flights seem insignificant, but they mark a great milestone in the world's progress.

Further work on the part of the Wright brothers developed an airplane which on October 5, 1905, was flown for four and one-half hours. The airplane was really "born." During the succeeding three years the Wright brothers suspended activities while securing patent rights. Then in the summer of 1908 they were ready to convince the world that they had actually accomplished what had long been thought impossible. Wilbur in France and Orville in the United States made several successful flights.

Other inventors, who had been working along similar lines, soon brought out their ideas. Notable among these early "aeroplanes" were the biplanes of Glenn H. Curtiss in America and of Voisin and Farman in France, and the French monoplanes of Bleriot, Deperdussin, and of the Nieuport company. This work gave us not the powerful airplane of today, but practically all the principles of the modern plane.

Prior to the achievement of the Wright brothers, there were numerous men in various parts of the world who had attempted to fly in heavier-than-air machines. The pioneers of modern aviation were of two schools of thought. One group attempted to achieve their object by means of gliders or motorless kite-like devices. In these they were able to soar through the air against the wind in much the same manner as a kite. Among those who made conspicuous efforts in this way may be mentioned Otto Lilienthal, the German who was the chief expounder of gliding flight; P. L. Pilcher, the Englishman; and Octave Chanute and J. J. Montgomery in America. The other school attempted to send their devices through the air by equipping them with motors. The motor was to cause a propeller to revolve, which would force the machine forward at high speed. Among the pioneers of this line of effort who actually built and tried power-driven airplanes, are included Clement Adler of France, Sir Hiram Stevens Maxim of England, and Samuel P. Langley of the United States. In no instance was success achieved. The machine was usually wrecked at the first trial and no idea was attained as to what was wrong with it.

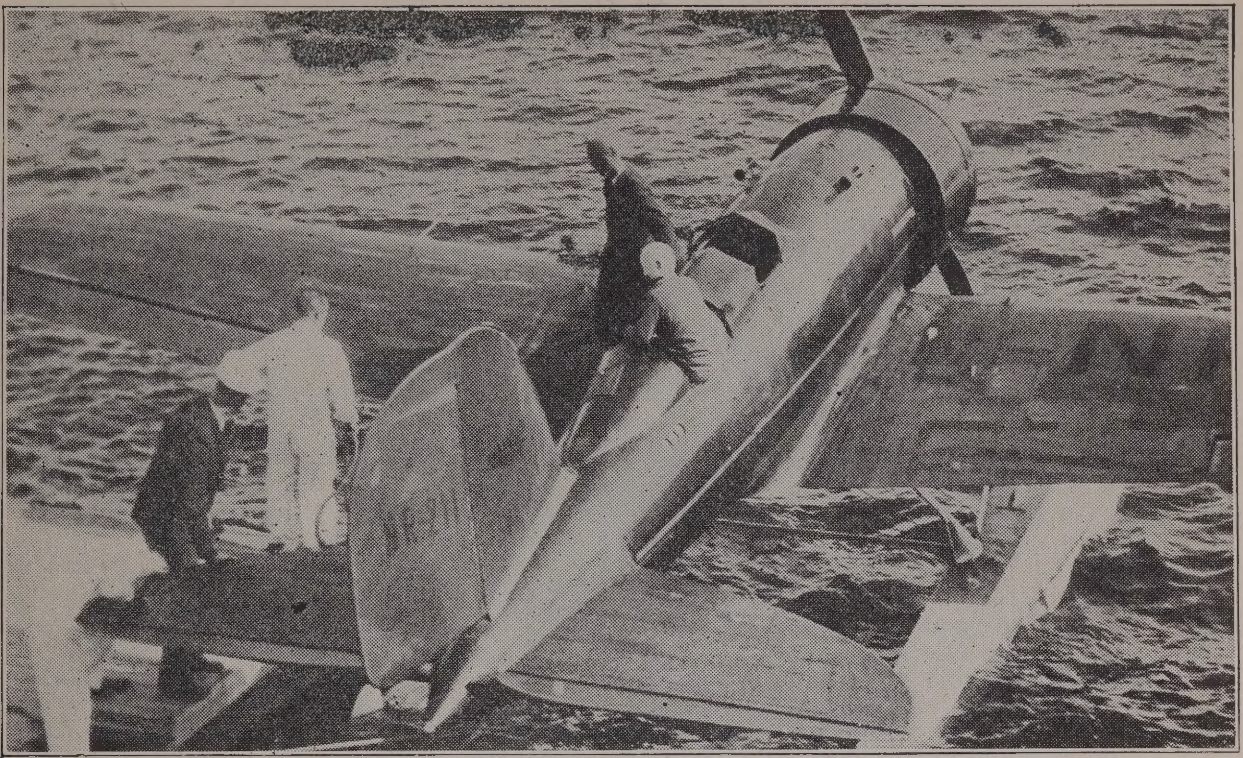
How an Airplane Works. The basic principle of the airplane is found by considering the action of a plane driven against the air. Air (which see) consists of many molecules of gas flying freely about. Although small and unable to resist the passage of powerful organisms like animals, these particles are nevertheless real and able to exert considerable force, as when they all rush in one direction in a wind.

If we take a plane—a light framework of wood covered with cloth or paper will do—and hold it at an angle against a wind, two things happen. First, the molecules rushing forward in the air strike the under surface, and tend to drive the plane back and up. If we prevent the plane from going back—as we do with a kite by tying a string to it—the only movement resulting from this pressure is upward. Second, the rush of wind past the plane takes molecules from behind and above the plane, thus creating a partial vacuum. In their efforts to press into this vacuum, the molecules below the plane exert an upward pressure, and thus help to support the plane. In a strong wind, these two forces are ample to support a plane, even when it has quite a heavy weight attached to it. The essentials are (1) a wind, and (2) a plane held in the proper position.

These principles explain why the kite flies, the tail being used to keep the "plane" in the proper position. The kite flies by being held stationary, so far as horizontal movement is concerned, against a wind. Since moving a body through motionless air creates the same effect as holding it motionless against a wind, in order to pass from a kite to an airplane, we need only find some way of moving our plane forward through the air, and keeping it in the proper position while moving. The whole problem, then, groups itself under three heads: (1) developing a suitable power plant and a means of applying its power to the air so as to keep the airplane in motion; (2) finding means for guiding and controlling the plane in flight; and (3) finding a body form which will present planes at the proper angle and carry all needed parts.

Langley attempted to fly an airplane powered with a steam engine. This was one of the greatest obstacles to his success, as a steam engine requires the engine itself, a boiler to make its steam, water and fuel. This excessive weight was out of proportion to the carrying power of the Langley machine. The problem of a light-weight power plant was solved by the invention and development of the gasoline engine. The remaining problem, so far as power was concerned, was applying the motor's power to the air—and the way for doing this was found in the screw propeller used on steamships. The srew propeller was based on the idea that blades set at an angle about a shaft would screw their way forward through the water just as a screw works into wood. By making the propeller large, and moving it rapidly—1,500 revolutions a minute or faster—the Wrights and others found that the idea could be applied to airplanes.

Controlling the airplane in flight presented three problems: (1) steering it in horizontal directions; (2) making it go up and down; (3) balancing it in gusts of wind. Extending a light frame work to the rear of the plane or planes, and placing a larger rudder at the end, solved the first problem. Another



THE "TINGMISSARTOQ" ARRIVES HOME © *Acme*

The Lindbergh seaplane rested on the waters of Biscayne Bay as Colonel and Mrs. Charles A. Lindbergh brought to a close their pathfinding tour on which they covered a distance of about 28,000 miles and touched on four continents. The plane was recently placed in the Hall of Ocean Life of the American Museum of Natural History in New York.

U. S. NAVY PATROL SQUADRON 10-F © *Acme*

Lieut. Commander Kneffler McGinnis inspects the officers and crew of the Navy Squadron in front of the seaplanes used on the record-breaking flight from San Francisco to Pearl Harbor, Honolulu.

large rudder, "lying on its side," did for the second. In the earlier models this rudder was placed on a second framework, extending to the front of the supporting planes. Later, one horizontal rudder was placed at each side of the steering rudder on the rearward framewok, and the front framework was eliminated.

Balancing proved the most difficult problem, but it was solved by means of "wingtips" or ailerons. These were soon made into horizontal rudders, one at each end of the upper plane, and so connected that when one rudder caused its end of the plane to rise, the other would depress its end. If a sudden gust should raise the right-hand side unduly, a simple movement on the part of the pilot would drive the right-hand end of the plane down and raise the left end, thus restoring the airplane to its proper position.

All that remained was to combine all these elements into a suitable body-plan. Early inventors were divided in their preference for one supporting plane (monoplane) or two, one above the other, (biplane). Machines were later constructed also with three supporting planes (triplane). The Wright brothers used a biplane in their early flights. Experience at first indicated that the biplane was better, although later the monoplane became very popular.

In early models the propeller was mounted in the rear, as it is on ships, and these airplanes were known as *pushers*. Later the propeller was placed in front, making a *tractor* (or *puller*) airplane. The rearward framework, supporting the rudders, was enclosed to make the *tail*. The enclosure was carried forward to surround the pilot's seat, with its working parts (the *cockpit*), and the engine. This complete enclosed body came to be known as the *fuselage*. A pair of rubber wheels and a tail-skid beneath the fuselage, to permit movement along the ground, came to be spoken of as the *running gear.*

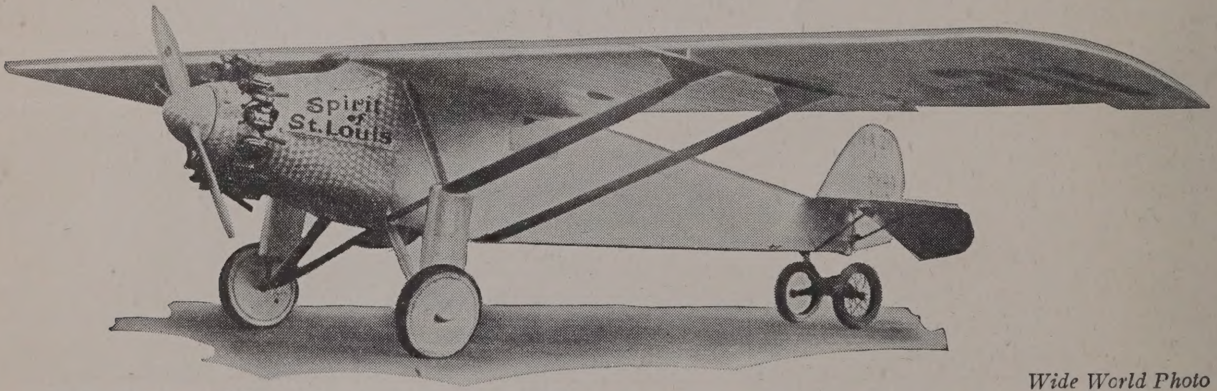
Col. Charles A. Lindbergh

The Autogiro. A comparatively recent invention is the autogiro, a machine using a different principal for staying aloft. This machine was invented by Senor Juan de la Cierva, at one time a member of the Spanish Cortes (parliament). Senor de la Cierva explained his machine as follows:

"My machine is a real airplane, not a helicopter. In principle it differs from the ordinary plane in only two respects—it rises into the air by means of a windmill horizontal propeller, and sustains itself in the air by means of the (horizontal) propeller's fan-shaped blades instead of the usual wings. The wings on my plane are almost negligible. They are used only to keep the machine horizontal." [In 1933 a successful autogiro without wings was built.]

Famous Airplane Flights and Records. Aviation was greatly stimulated by the extensive use of airplanes during the World War. The first non-stop trans-Atlantic flight was made in a Vickers-Vimy machine in 1919 by Alcock and Brown, two Englishmen. They flew from Newfoundland to Ireland in fifteen hours and fifty-seven minutes. In the same year, Lieutenant Commander Read of the U. S. Navy also succeeded in crossing the Atlantic in a navy hydroplane, the *NC*-4. He stopped at the Azores. On his entire flight he covered some 4,250 miles in fifty-three hours and thirty-four minutes.

Another milestone in the progress of aviation was the round-the-world flight of the Air Service of the United States Army. The expedition left Seattle, Washington, April 1, 1924, in four airplanes. The personnel consisted of Major F. L. Martin, commander; Lieut. Lowell H. Smith, second in command; A. I. Harvey, L. P. Arnold, John Harding, E. H. Nelson, H. H. Ogden, and Leigh Wade. Major Martin's plane crashed in Alaska, and it took him and his mechanic eleven days to



Wide World Photo

THE FIRST AIRPLANE TO FLY OVER THE ATLANTIC FROM MAINLAND TO MAINLAND WITHOUT STOPPING.

Note the single Wright Whirlwind motor, the few but sturdy struts, the trim, air-slitting lines and the lack of any means for direct vision forward. A periscope was used.

reach civilization, although both were uninjured. The other three planes continued the flight. They were successful in encircling the globe, and after travelling about 26,000 miles arrived at San Diego, California, on September 22, 1924.

In 1926 Lieutenant-Commander Byrd, accompanied by the late Floyd Bennett, made his famous flight over the North Pole in the airplane *Josephine Ford.* (See POLAR EXPLORATION.)

The year 1927 was a great year in aviation. The climax was reached in the flight of Charles A. Lindbergh from Roosevelt Field, Long Island, to Le Bourget Field, Paris, France, in the airplane *Spirit of St. Louis.* This was the first non-stop trans-Atlantic flight from North America to the mainland of Europe. The flying time was thirty-three hours and thirty minutes. The flight was made in a Ryan monoplane equipped with a Wright whirlwind motor. As a reward, Lindbergh received the $25,000 Raymond Orteig prize. He was promoted from Captain to Colonel in the Missouri National Guard, and was awarded medals and distinctions too numerous to mention here.

In the same year, Clarence D. Chamberlain, accompanied by Charles A. Levine, piloted the airplane *Columbia* from New York City to Eisleben, Germany. They then continued to Berlin. Commander Byrd, accompanied by Acosta, Balchen and Noville, made a flight from Roosevelt Field to the coast of France in the trimotored plane *America.* Several flights were made over the Pacific during this year. Lieutenant Maitland and Lieutenant Hegenberger, of the U. S. Army, made the first non-stop flight from the United States to Hawaii. Three other successful flights were made.

In 1928 the first successful east-to-west flight of the North Atlantic was made in the airplane *Bremen* by Baron von Huenefeld, Captain Herman Koehl and Major James Fitzmaurice. Another outstanding achievement of that year was the flight of the airplane *Southern Cross* from America to Australia, spanning the Pacific in four "hops."

In 1929 two successful flights over the North Atlantic were made. Three Frenchmen, and a stowaway, made the flight from Old Orchard, Maine, to Santander, Spain. Their destination was Paris. Roger Q. Williams and Lewis A. Yancey made an attempted non-stop flight to Rome, but were also forced down in Spain. After refuelling they continued on to Rome. On September 11, 1929, a world's record for airplane speed of 357.7 miles an hour was set by Squadron Leader Orlebar of Great Britain, in a supermarine Rolls Royce.

In 1930 a new altitude record of 43,166 feet was set by Lieutenant Apollo Soucek of the U. S. Navy. In the previous year he had set an altitude record for seaplanes of 38,560 feet. Wing Commander Charles Kingford-Smith of Australia arrived at the Oakland airport in California with the airplane *Southern Cross* to complete his "round-the-world" flight. The flight began with the trip of the *Southern Cross* from America to Australia in 1928. The first non-stop flight from Paris to New York was made in 1930 by Captain Dieudonne Coste and his mechanic, Maurice Bellonte, in the airplane *Question Mark.* The flight was continued to Dallas, Texas, where an award of $25,000 was made to the flyers by Col. W. E. Easterwood. At the close of 1930 the Italian air "Armada" of twelve planes with two alternates was ready to fly for South America under the command of General Italo Balbo. The flight was completed by ten planes on January 6, 1931.

In 1931, the outstanding occurrence was the round-the-world flight in the *Winnie Mae* by Wiley Post and Harold Gatty. The flight was made in eight days, fifteen hours and fifty-one minutes. A new record was set from England to Australia in this year by C. W. A. Scott, formerly of the Royal Air Force. He made the flight in nine days, three hours and twenty minutes. A new non-stop record flight was made by Russell Boardman and John Polando from New York City to Istanbul (Constantinople) Turkey. Major James Doolittle set a new record for coast-to-coast flight by flying from Burbank, California, to Newark, New Jersey, in eleven hours and fifteen minutes. A new official world's air speed record of 408.8 miles an hour was set September 29, 1931, by Flight Lieut. G. H. Stainforth of Great Britain.

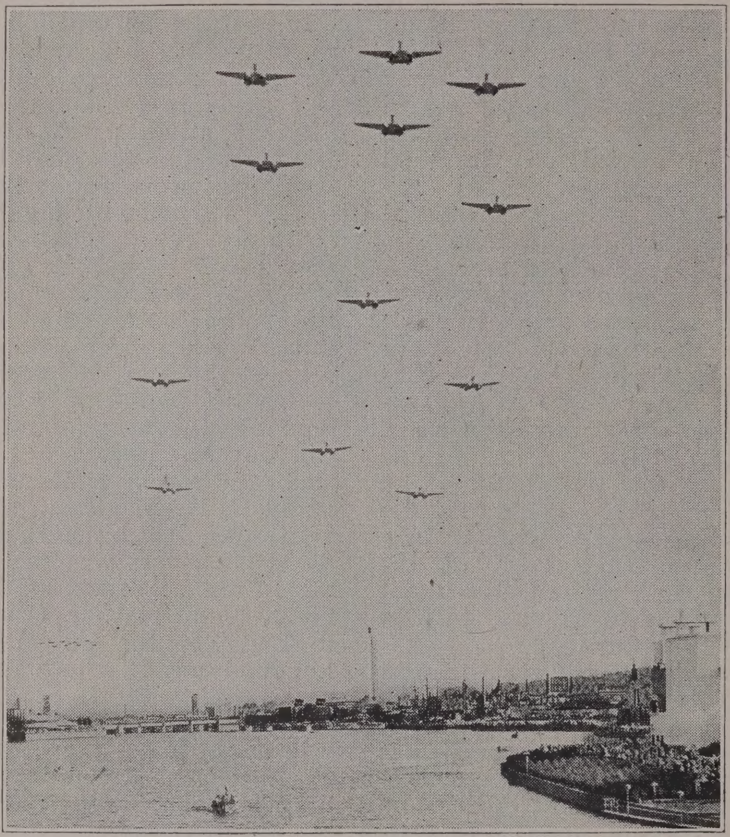
In 1932, Amelia Earhart Putnam, who as Amelia Earhart was the first woman to fly the Atlantic in 1928, made a successful solo flight from Harbor Grace, Newfoundland, to a point near Culmore, five miles from Londonderry, Northern Ireland. Later in the year, the eminent Scottish pilot, Captain James A. Mollison, made the first westward solo flight over the North Atlantic, from Portmarnock, Ireland, to Penfield Ridge, near St. John, New Brunswick. On November 18, Amy Johnson Mollison, brought her tiny monoplane *Desert Cloud* down at Capetown Airport, Union of South Africa, having covered the 6,250 miles from London in the record time of four days and seven hours. She flew back to England in seven days and seven hours, surpassing the previous record by about two days. On September 3, Major James A. Doolittle set a new speed record for land planes of 296.287 miles an hour.

The year 1933 was replete with new records in the field of aviation. New speed records were set by both sea and land planes. Among the outstanding flights were the solo flight around the world by Wiley Post, and the great mass flight of twenty-four seaplanes from Italy to A Century of Progress, and return.

SPEED RECORDS. At Denzano, Italy, on April 10, 1933, the seaplane *Red Bullet* set a new speed record with Warrant Officer Francesco Agello at the controls. Agello flew an average of 426.5 miles an hour for five laps over Lake Garda. The previous record was 408.8 miles an hour, set by Flight-Lieutenant George H. Stainforth of Great Britain in 1931.

A new speed record for land planes was set by James R. Wedell in a plane of his own design at the Chicago Air Races in early September, 1933. He completed a flight around a three-kilometer course three times at an average speed of 305.33 miles an hour. His Wedell Williams Special Racer No. 44 was powered by the same motor as was used by Major James Doolittle when he set the previous record by beating that of France in 1932.

Italian Mass Flight. Under the command of General Italo Balbo, the Italian "Armada" of twenty-four seaplanes took off from Orbetello, Italy, on June 30, 1933. The flight to Chicago was made by the "northern route," in six stages. At Amsterdam one of the planes capsized in landing and a member of the crew was killed. Another plane took its place. The two squadrons of twelve planes each arrived at Chicago on July 15. One by one the great seaplanes, each weighing eleven tons, were brought to rest on the waters of Lake Michigan with precision and safety. This was indeed the greatest mass flight that had ever occurred. After spending several days in Chicago, the Italians flew to New York. General Balbo and some of the other high officers visited Washington and were entertained by President Roosevelt. After some delay, because of the weather, it was decided to make the flight home by way of the Azores. There, because of the narrow harbor, one of the planes was damaged and a lieutenant lost his life. The other twenty-three planes were successfully brought down at Flumicina airport, near Ostia, the seaport of Rome, on August 12, 1933. Premier Mussolini welcomed the flyers. On the following day, an ancient Roman custom was revived and the flyers marched triumphantly beneath the 1,600-year-old arch of the Emperor Constantine, near the Coliseum. General Balbo was raised to the rank of Air Marshal and each of the other participants in the flight was advanced a grade.



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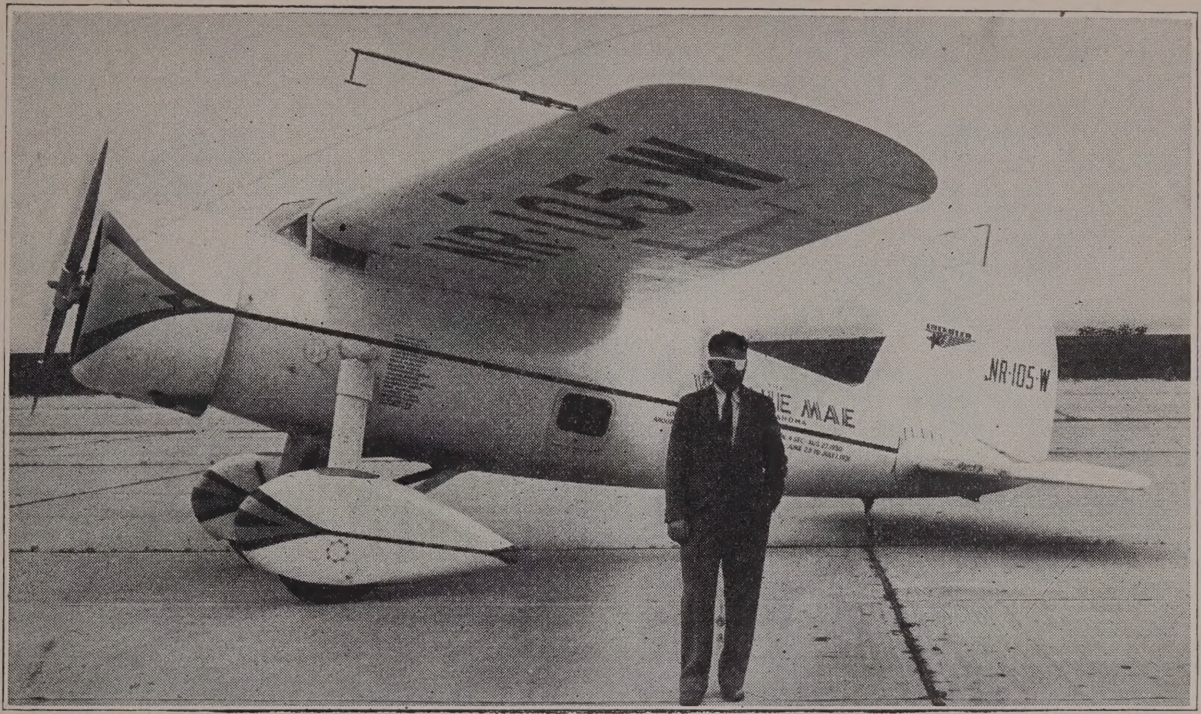
General Balbo's Air Fleet Arriving at Chicago

The two squadrons of twelve planes each may be seen winging their way to the close of their 6,100 mile flight from Orbetello, Italy, to A Century of Progress.

Post's Flight. Early in the morning of July 16, the day following the arrival of the Italian "Armada" at Chicago, Wiley Post took off in the *Winnie Mae* from Floyd Bennett Field, New York, in an attempt to better the round-the-world record set by himself and Harold Gatty in the same ship two years previously. This time, however, Post was the sole occupant of the plane, except for the so-called robot pilot, by means of which he was able to allow the plane to fly itself and so get some rest during the long grind. The plane is a Lockheed-Vega cantilever high-wing monoplane, powered with a supercharged Pratt and Whitney Wasp motor. Post was successful in his attempt. He brought the fleet monoplane down to a safe landing on Floyd Bennett Field at 11:59 P. M. on July 22, just seven days, eighteen hours and forty-nine minutes from the time he started on his record-breaking flight. The aviator, who at one time was a Texas farmer and later an oil driller in Oklahoma, also became the first person in history to pilot a plane alone around the world. (See illustration on next page.)

Non-Stop Long-Distance Record. Lieutenant Maurice Rossi and Paul Codos of France landed their Bleriot monoplane at Rayak, Syria, at 5:10 P. M. on August 7, 1933. They had completed a new non-stop long-distance record of 5,900 miles, the flight having started at New York City. The Frenchmen's feat exceeded by 560 miles the former record of 5,340 miles established in



THE MAN AND THE PLANE THAT HOLD THE ROUND-THE-WORLD RECORD
Wiley Post and the monoplane *Winnie Mae,* in which he girdled the northern part of the globe in seven days, eighteen hours and forty-nine minutes.

February, 1933, by O. R. Gayford and G. E. Nicholetts, from England to South Africa.

NEW UNITED STATES COAST-TO-COAST RECORD FOR WOMEN. On July 8, 1933, Amelia Earhart Putnam, the first woman to fly the Atlantic alone, set a new record in a flight from Los Angeles to Newark, New Jersey. She arrived at Newark exactly seventeen hours, seven minutes and thirty seconds after leaving Los Angeles. She thus exceeded by one hour, fifty-six minutes and thirty seconds her previous record of 1932.

NEW COAST-TO-COAST RECORD FOR MEN. Colonel Roscoe Turner made the flight from Los Angeles to New York in ten hours, five minutes and thirty seconds on September 25, 1933. He thus cut thirteen minutes and thirty seconds from the mark set in August, 1932, by James H. Haizlip. The new mark is not only a transcontinental record, but also a record for the distance of 2,520 miles.

Colonel Turner also set other records during the year. During the National Air Races at Los Angeles, he flew from New York to Los Angeles in eleven hours and thirty minutes to win the transcontinental race in record time, breaking his own mark by one hour and three minutes. He also won the two closed course events of the Races.

MOLLISON FLIGHTS. In February, 1933, Captain James A. Mollison, the noted British aviator and the only man to fly the North Atlantic alone from east to west, made a flight in his four-cylindered monoplane *The Heart's Content* across the South Atlantic from Theiss, Senegal, to Natal, Brazil. He made the entire journey from England to Brazil in three days and ten hours.

In July, Captain Mollison and his wife, the famous Amy Johnson, made a flight from Wales over the North Atlantic. New York City was their destination, but the plane ran out of gasoline and they were forced to land near Stratford, Connecticut. Mollison was so tired after covering the 3,190 miles since leaving Pendine, Wales, that he could not make the landing at the airport, but crashed his plane in a nearby swamp. The landing gear bogged down and was torn off and the plane nosed over. The aviators were both severely cut and bruised, but after a few days in the hospital, they were as good as ever.

Aeschines (*ĕs′kĭ-nēz*), a noted Athenian orator, the rival and opponent of Demosthenes. After a varied career, as an actor on the stage and a public speaker of great eloquence, he was exiled and settled in Rhodes. Here he founded a school of eloquence. Three of his orations have come down to us, perhaps the most famous being that *Against Ctesiphon.* He died in Samos 314 B. C., at the age of 76.

Aeschylus (*ĕs′kĭ-lŭs*) (525-456 B. C.), the earliest of the great Attic tragedians. He was born at Eleusis, of a noble family, and took an honorable part in the Persian war. His first efforts at tragedy are said to have been suggested by the god Bacchus, who appeared to him while asleep in the fields. At the age of 41 he won his first prize in the dramatic contests popular among the Athenians, and during his life was thirteen times victor. He was finally defeated by Sophocles and went to Sicily, where he lived with Hiero, the tyrant of Syracuse. Tradition says his death was caused by an eagle dropping a tortoise, to break its shell, on his bald head, which the bird had mistaken for a stone. Attic tragedy owes much to Æschylus. He first brought in a second actor, befitting costumes and scenery, and caused a regular stage to be built. He wrote seventy tragedies, of which only seven are now in existence: *The Seven Against Thebes, The Suppliants, The Persians, Prometheus Bound, The Choëphori,* and *The Eumenides.* Mrs. Browning's poetical version of *Prometheus Bound* is one of the best of the many translations of his tragedies.

Æsculapius (*ĕs-kū-lā'pĭ-ŭs*), in Greek fable, the god of medicine and patron of physicians, called by Homer the Blameless Physician. He was the son of Apollo. He went about healing and raising from the dead until Pluto, god of the lower world, finding his kingdom was losing its people, appealed to Jupiter, who destroyed Æsculapius by a thunderbolt. Various temples were built in his honor. The most famous was at Epidaurus, where a peculiar breed of snakes was believed to have received healing power from Æsculapius. During a pestilence the Greeks used to send for one of these serpents. The Romans also sent a solemn embassy to bring one of these healing snakes to their city, and later introduced the worship of Æsculapius at Rome. The priests of the temples of this god, called called Æsclepiades, or sons of Æsculapius, were the only regular physicians of antiquity.

Æsir (*ē'sĭr* or *â'sĭr*), the great gods in Norse mythology. Included in this pantheon originally were Odin (Woden), Thor (Donar), Tyr (Tiu), Balder, Forseti, Heimdall, Loki, Hoenir, Ull, Vitharr, Vali, and Bragi. Each of these gods occupied a throne in Gladsheim. The three *Vanir* deities Njorth, Frey and Freya, shared in the Æsir's rule. By force of arms the Æsir gods had been forced to permit these deities to share in their sacrifices. The *Vanir* deities were wealthy gods who dwelt in the south. Trade and commerce were their especial interest. The goddesses of Asgard, known as the *Asynjur,* were also associated with the Æsir gods, although they were of minor importance.

Loki, a god originally associated with the Æsir, in time became the leader of the giant forces of Hel. There followed the *Ragnarok,* the "Twilight of the Gods." In the conflict between the Æsir gods and the giants of Hel, most of the Æsir gods were destroyed. Odin, Thor, Tyr and Frey were slain, "the sun darkens, the earth sinks into the sea, flames lick the sky." According to mythology two humans, Lif and Lifthrasir ("Life and Life Desiring"), were preserved "to repeople the earth."

See ASYNJUR; BALDUR; ODIN; RAGNAROK; THOR; VANIR.

Æsop (*ē'sŏp*), a Greek writer of fables, was born about 620 B.C. Little is really known of either his life or his works. Some legends hold that he was a native of Phrygia, that he was sold in Athens as a slave and later freed by his master. He won renown as a writer and was invited by Crœsus, king of Lydia, to live at his court. He was sent by Crœsus, about 564 B.C., to the temple of Apollo at Delphi where he angered the Delphians by his sarcasm and was hurled from a precipice.

Not one of Æsop's original works has been preserved. His name has come down through the centuries, however, attached to those beast fables which charm their readers, both young and old, today as much as they did the Romans centuries ago. The fables which bear his name have been translated into many languages and have been read far and wide. Æsop's fables, of which there are more than two hundred, are, according to some accounts, but mere reproductions or variations of extant Asiatic fables. Other authorities ascribe them to later authors.

It is probable that Æsop only told his fables to his listeners, and did not himself write them down. The ones printed under his name are probably not his own, but nevertheless reflect the spirit if not the exact substance of his utterance. The collection most generally used is that made from oral memories by Demetrius Phalereus of Athens, about 320 B.C. It was turned into Latin by Phædrus in the first century A.D., which version is the usual one. Phædrus made many additions to Phalereus, however, which are greatly inferior to the original. This collection has been edited and translated many times since. There is a verse translation made by Babrius, a Greek poet of the late first century.

The origin of the fables is of course Oriental, but they are much superior to their prototypes. It is considered very likely that these ascribed to Æsop are actually from the master fabulist, although greatly altered. Their distinction lies in the characteristics which are considered to be those of the real Æsop, who is not the myth or legend that some suppose, but undoubtedly lived. The statue erected to him by the great Lysippus of Athens is proof of his existence. Aristophanes had the characters in his comedies learn the fables. Socrates versified them, and Plato gave them his approval. Both Herodotus and Plutarch have written lives of Æsop. The special qualities which the fables possess lie in their extensive generalization, their marvelous compression, and the remarkable character analysis by traits and tendencies. These unique distinctions seem conclusive evidence that they originated with Æsop, who related them in the mighty age of Greece.

Æsthetics (*ĕs-thĕt'ĭks*), a term signifying perceptible to the senses, and denoting the science of the beautiful in nature and the fine arts (Greek, *æsthetikos*). The term æsthetics, though a modern German one, is one which, in its meaning, was familiar to the ancient Greek philosophers, especially to Socrates, Plato and Aristotle. What they meant by the term, was the quality in the beautiful that produces to the mind as well as to the eye a certain pleasing effect and a refined pleasure. When we speak of æsthetic ideas, studies or emotions we mean those things that appeal to our sense of the beautiful, or that treat of the expression and embodiment of beauty by art.

Ætna, Mount. See Etna.

Ætolia (*ē-tō'lĭ-ȧ*), a district of ancient Greece and a part of the Department of Ætolia and Acarnania in the modern kingdom of Greece. This district was once a rival of the Achæan League and here, it is claimed, Meleager slew the Calydonian boar. It extends over an area of 3,013 square miles and has a population of 220,055. The most important cities in the Department are Missolonghi, the capital, and Lepanto.

See Greece.

Afghanistan (*ăf-găn-ĭs-tän'*), a mountainous country of south Central Asia. It extends over an area of about 255,000 square miles, bounded on the west by Persia, on the south by Baluchistan, on the east by British India, and on the north by Turkoman, S.S.R. of the U.S.S.R. Afghanistan was formerly a part of the empire of Timur the Great. Its independence was declared in 1747. In 1838 the British sent an army into Afghanistan to restore the Amir Shah Shuja, who had been driven into exile in India, to the throne. In 1841 the British suppressed a revolt in Afghanistan and since that date British influence has been of great importance in that region. Prior to the Russian revolution of 1917 it was frequently referred to as the "buffer state" between British India and Turkistan, then a province of Russia, which lies to the north of it.

The arid and mountainous country of Arghanistan has several magnificent mountain ranges chief among which is the Hindu Khush. This range rises in the northeastern part of the country, touching upon the northwestern end of the Himalayas, its peaks towering 23,000 feet above the sea. The three most important rivers flowing through the country are the Oxus, the Indus and the Helmand. The climate varies greatly from regions where snow never falls to those regions where it seldom melts. Rainfall in this dry country is scanty. It is generally a healthful country and the most common diseases with which the Afghans are afflicted are fevers and diseases of the eye.

Production and Industry. Afghanistan abounds in fertile plains and valleys, which, aided by irrigation (*karez*), yield excellent crops. There are two harvests each year. Wheat, barley, and lentils are sown each autumn and reaped in the summer. Rice, millet and corn are sown in the spring and reaped in the autumn. There is an abundance of almonds, pomegranates, figs, grapes, peaches, quinces, cherries, apricots and plums. The castor oil plant, madder, and asafœtida plant are extensively grown for export purposes. Both fresh and preserved fruit form a staple food of the Afghans throughout the year. The meat diet of the population consists of the fat-tailed sheep native to Afghanistan. The fat stored in the immense tail of the animal is used as a substitute for butter. The most important imports of the country are textiles, metals and hardware, leather goods, tea, sugar, indigo and other dye materials.

The mountains of northern Afghanistan are rich in minerals including copper, lead and iron. Coal deposits are found in the Ghorband Valley and near the Khurd Kabul Pass. Small quantities of gold are found in the Laghman Hills and Kunar. There are precious stones, the lapis lazuli, abounding in Badakhshan, being the most valuable.

The principal manufactures include clothes, silks, felts, carpets and various articles made from goat's and camel's hair and sheepskin. This merchandise is transported over the seven trade routes leading to India and Persia by camel, mule or pony. There are no railways in Afghanistan.

Government. Afghanistan is a constitutional monarchy. The King, Mohammed Zahir Khan, governs according to the Constitution and the sacred law of Islam. The National Council of State sits permanently at Kabul. It is composed of 106 deputies who are selected from each of the administrative divisions of the country and from the clans. The Cabinet is presided over by the Prime Minister. Every four years a Great Assembly is summoned to consider major questions of policy which are referred to it by the King. This Assembly is intended to represent the whole Afghan people.

There are five major provinces in Afghanistan and four minor provinces. The major provinces, Kabul, Mezar, Kandahar, Herat, and Kataghan-Badakhshan, are under the control of a governor who is known as the *Naib-ul-Hukumeh.* In the minor provinces, Simat-i-Janubi (Southern Province), Simat-i-Mashriqi (Eastern Province), Farah, and Maimena, the governor is called the *Hakim-i-'Aala.*

Prior to 1926 the monarch of this country bore the title of Amir. The title of King was formally adopted in that year. The present king of Afghanistan assumed the throne in November, 1933, upon the murder of his father King Nadir Shah Ghazi.

Early in 1932 the then reigning king, Nadir Shah Ghazi, proclaimed a new constitution for the country. The new law declared the complete independence of Afghanistan, established Islam as the official religion of the country, forbade slavery and forced labor, and established a compulsory primary education system under state supervision. New laws originate with the Ministers, are passed upon by the National Council, and signed by the King.

Population. There are many tribes and nationalities dwelling within the confines of Afghanistan, the total population of which is estimated at about 11,000,000. Three-fifths of this population is composed of the Afghans or Pathans, a people of mixed ancestry who speak the Pushtoo language. The principal tribes in Afghanistan are the Duranis dwelling in the west and south, the Ghilzais in the east, and the Yusufzais and Afridis dwelling on the Indian frontier. The principal languages spoken throughout the country are Persian, Pushtoo, and Turkish.

The most important cities are Kabul, the capital, with an estimated population of about 80,000; Kandahar (60,000); and Herat (30,000).

History. Although it was feared that internal dissension and political intrigue within Afghanistan would spread over the country soon after the assassination of King Nadir Shah in November, 1933, no outbreak has thus far occurred to confirm such fears. The new king upon the throne has met with the approval of the entire nation. Soviet Russia, India, Persia, and even Great Britain and France, countries with which Nadir Shah had established friendly relations, evinced no little concern over the outcome of the king's death and the succession to the throne. Their fears of civil war were, however, wholly unfounded. Former King Amanullah, still in exile in Italy, has progressed but little with his plot to regain his throne. In accordance with Article V of the Constitution of Afghanistan Mohamed Zahir Khan, twenty-one year old son of Nadir Shah, succeeded to the throne.

Nadir Shah met his death at the hands of Abdul Khaliq who murdered the King for revenge. His death was avenged early in 1934 when his assailant and twenty-eight conspirators were executed. Their execution has resulted in the establishment of peace and order in Afghanistan and Zahir Khan reigns with the full support of his people.

One of the new King's staunchest supporters is his uncle, Marshal Shah Wali Khan of the Afghan Army and Minister from Afghanistan to France. Shah Wali Khan occupies a most important position and his decisions profoundly affect both the domestic and foreign policies of Afghanistan. It was to him that Afghanistan's diplomatists appealed upon the assassination of Nadir Shah since the late king had honored him as the "First Representative of the King." Nadir Shah owed much to his brother, Shah Wali Khan, who was responsible for the expulsion of Bacha-i-Saqao, the bandit usurper, from Kabul and the establishment of Nadir Shah upon the Afghan throne. To-day Shah Wali Khan is a national hero in Afghanistan. He was ever loyal to his brother, Nadir Shah, and when the Afghan diplomats appealed to him in Paris, he but expressed his determination to maintain that family solidarity which Afghanistan has witnessed in years past. He has given his full support to his nephew, the new king. Afghanistan's diplomatists, ever guided by Shah Wali Khan, have pledged their allegiance to the son of Nadir Shah.

Shah Wali Khan has had a most interesting career, one which has frequently been threatened by the treachery of Amanullah, now in exile. He was educated at Harbia College, in Kabul. At the age of eighteen he entered the army with the rank of captain in the Royal Guards regiment in Kabul. He rose rapidly from his captaincy through the ranks of Colonel, Brigadier-General and Major-General. As Major-General in the Afghan Army he conducted a brilliant campaign in Waziristan in 1919, defeating the British who held military posts there. He was promoted to the rank of General for his services in protecting the interests of Afghanistan in Waziristan. In 1920 he was appointed Assistant Commander-in-Chief of the Army. A short time later he became Minister of war. In 1925 he successfully suppressed a rebellion in Khost only to find, upon his return to Kabul, that King Amanullah was no longer his ally and had no further need of his counsel. For four years Shah Wali Khan and his brother, Nadir Shah, dwelt as voluntary exiles in France. In 1929, however, when Bacha-i-Saqao drove Amanullah from the throne, Shah Wali Khan realized just how grave a situation was enveloping Afghanistan and understood his country's need for a capable military leader to thwart the plans of the bandit usurper. Here again General Shah Wali Khan proved himself a mighty warrior. Bacha-i-Saqao was captured and promptly executed. It is little wonder then that Shah Wali Khan exercises such a powerful influence in the shaping of Afghan policies. He is a dynamic figure in the affairs of Afghanistan to-day, a forceful military and diplomatic leader, a leader whose capabilities are clearly recognized and admired in foreign diplomatic circles. It is well that he so wholeheartedly supports the new King.

Afghanistan has vast mineral resources the development of which would provide great economic prosperity for the nation. There are vast undeveloped deposits of copper, lead and iron, and coal. One of the greatest desires of Shah Wali Khan is to see Afghanistan attain economic prosperity, a prosperity which the Afghan General believes could be attained by developing the mineral resources of the country.

According to the Calcutta *Statesman,* no change in either the foreign or domestic policies of Afghanistan is anticipated at the present time. The new régime has reassured the neighboring countries that no struggle or civil war will be forthcoming in the Afghan monarchy at the moment, an upheaval which it was greatly feared would arouse the tribes on the frontiers of India to a state of active warfare. The reforms effected by Nadir Shah, who ruled in accordance with the sacred law of Islam, were eagerly accepted and adhered to by the Afghan people and this unanimous approval of the régime of Nadir Shah has undoubtedly been of great importance in the support accorded his son, King Zahir Khan, by the Afghan populace.

Africa (*ăf′rĭ-kă*). A hundred years ago the continent of Africa was almost unknown to the educated world of Europe and North America as regards its vast interior.

WHY AFRICA SO LONG REMAINED UNEXPLORED

Why was Africa the last of the great continents to be effectively opened up? Partly because of the comparative abundance of its negro population, its warlike character and sturdiness of physique, which made it a very serious enemy to the pioneer before the days of machine guns; partly because of the great heat, and most of all, the moist heat of much of Negro Africa, and of the germ-diseases more prevalent there than any other part of the globe; and partly, perhaps mainly, because of the remarkable continuity of the African coastline, the striking absence of those great gulfs, those far-reaching straits or inlets of the sea, those rivers navigable from their mouths upwards for hundreds of miles, which are so prominent a feature in the geography of Asia, Europe, and the eastern side of America. Any far-reaching exploration of the African continent had to be made by land, over a country more savage, less imbued even with the elements of civilization than Asia or America. The navigability of rivers where it was not barred by cataracts or shallows, was choked with a growth of vegetation, the riding animals (horses, asses, oxen) were killed by the bite of the tsetse fly or by some other injected germ disease. All Africa outside the waterless deserts must have seemed to the first pioneers impassable from thickets or forest. In short, it needed tremendous resolution and bravery and all the most recent appliances of civilization before Africa could be conquered for the white man's knowledge. And this result has only been finally achieved within the memory of middle-aged people now living. In 1875 the interior of Africa was still very little known. By 1914 it had been made better known than the interior of Asia or South America.

AFRICA TEN MILLION YEARS AGO

Africa is a sister continent to South America, which it slightly resembles in shape. In the more ancient history of the earth (say ten million years ago), Africa was connected by a land bridge with South America on the one hand, with India, Ceylon, Malaysia, and Australia on the other; while Australia and New Zealand were probably connected with the west side of South America, and South America across Antarctica with Australia. This is virtually proved by the similarity and coincidence of geological formations and the possession of an almost uniform flora in the Mesozoic age. In fact, this great continental belt is sometimes called "Gondwanaland" (from the typical rocks of Gondwana in the Indiana Dekkan) and sometimes the *Glossopteris* Continent, because of the predominant vegetation prevailing at the beginning of the Secondary Epoch. These regions might also be termed the "Diamond" Continent; for all the detached portions at the present day agree in possessing diamonds. Outside their areas no true diamonds are found except some doubtful examples in North America and Scandinavia. It is further interesting to note that the diamonds of South Africa rather resemble in quality and composition those of Australia than those of Liberia (West Africa), which are more akin to the diamonds of India, Guiana, and Brazil. Long after Glossopteris land had been broken up, a land connection subsisted more or less between Tropical Africa and India, and still more, and still later, between West Africa and Brazil. This is the only supposition which will explain the remarkable correspondence in many features between the fauna and flora of Tropical Africa and Tropical America, especially the Brazil-Guiana region and the West Indies.

THE AFRICA OF TODAY

The Africa of today, which has been for two million years or so separated from the great island of Madagascar, extends but little either north or south into the Temperate Zones. It is perhaps the most tropical of the continents, presents the greatest amount of land area to the vertical sun, and is consequently the hottest of the continents. Its greatest length, 5,000 miles, is from north to south, from Latitude 37°20′ N. (Cap Blanc, near Bizerta, in Tunis) to 34°51′ S. (Cape Agulhas, Cape Colony); and its greatest breadth—about 4,000 miles—is from Senegal to the eastern horn of Somaliland. Its total area is about 11,500,000 square miles. The northernmost projection of the continent, Mauretania, is noteworthy, especially in its western portion, for its high plateaus and ranges of lofty mountains, which culminate in the Atlas peaks of Morocco, attaining to more than 15,000 feet in altitude and being under perpetual snow. The Tripolitaine, which lies to the east of Mauretania, is little else than the Mediterranean coast of the Sahara, and consists of ranges of stony hills, low mountains, and arid plateaus, with occasional wastes of shifting sand, and a few depressions known as oases, wherein an easily reached water-supply maintains a comparatively rich vegetation. Egypt is a prolongation of this desert region traversed by the course of the Nile, which in its delta completely banishes the desert and presents us with a region of fertile mud and rich vegetation of a European and Asiatic character. The Sahara Desert region extends with nothing but the interruption of the Nile—and the few miles of cultivated region on either side of the Nile, between the Red Sea on the east and the Atlantic Ocean on the west. Arabia carries on the characteristics of the Sahara to the south of Persia and the northwest of India.

MOUNTAINS AND PLATEAUS

In Eastern Nigeria between the Eastern Niger, the Benue, and Lake Chad, and on the southern frontier of the central Sahara, there are high mountains which may attain to as much as 7,000 feet, perhaps more. South of the Benue the country is very mountainous, with altitudes of as much as 8,000 feet. Advancing from the Benue towards the Gulf of Guinea, we meet with peaks mostly of volcanic origin of 9,000 and 10,000 feet, culminating in the great volcanic mountain of the Cameroons, which is about 13,000 feet and is occasionally capped with snow. A few miles away to the west of the Cameroons lies the 10,000 feet high valcano of Fernando Po Island. From the Cameroons southwards there is an almost unbroken range of mountains at no great distance from the coast, which, except for the passage of a few great rivers, is continuous with Table Mountain at the Cape of Good Hope. The greater part of the center of Africa from the southern Sahara Desert to the southernmost limits of the Congo, is at an average altitude of 1,500 feet above sea level (with depressed areas and ancient lake-basins here and there). On the east this comparative flatness gives place somewhat abruptly to plateaus of 6,000 to 8,000 feet in height, above which towers the snow range of Ruwenzori (the true Mountains of the Moon), nearly under the Equator.

RAINFALL, FORESTS AND ANIMAL LIFE

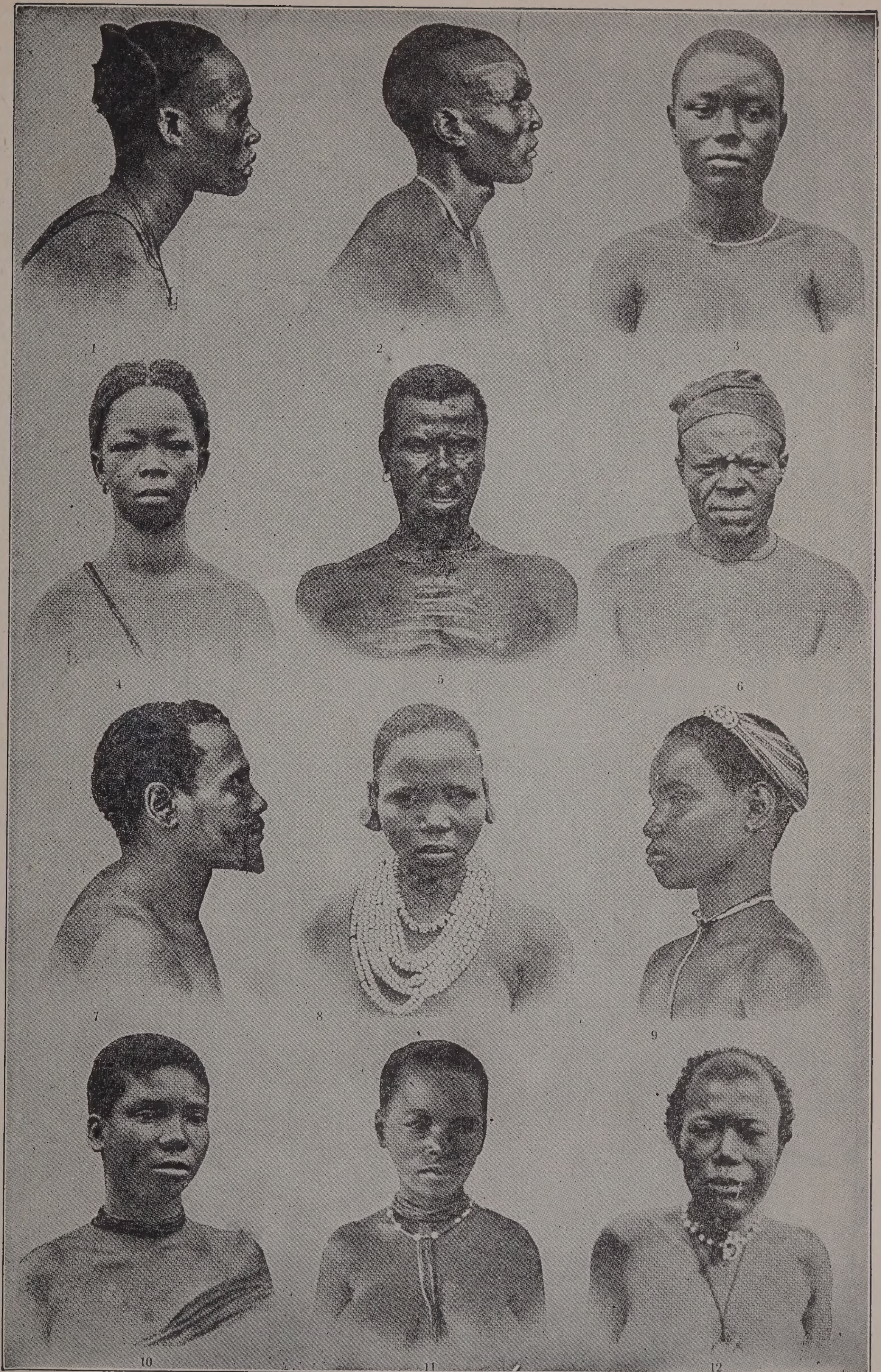
West Africa has a much greater rainfall than the eastern half of the continent. There is, however, a somewhat well-marked rainy equatorial belt, which extends from the Victoria Nyanza on the east to the Gambia River on the west, and expands over a good deal of the basin of the Congo, the lower and the upper Niger. This equatorial belt has some of the most splendid tropical forests the world can show. It is in this region also, expecially in Central Africa, that some of the most rare and remarkable of African mammals continue to exist, such as the great Anthropoid Apes (Gorilla and Chimpanzi), the strange Drill and Mandrill Baboons, the Okapi, the Chevrotain, and (in Liberia) the Pygmy Hippopotamus and Zebra Antelope. The Lion has become extinct in North Africa within the last few years, but a Leopard of very large size still exists there, together with a Striped Hyena and the Common Jackal, the true Wild Boar, the Porcupine, and a Red Deer allied to that of Southern Europe. The Sahara Desert is by no means devoid of animal life. A few Lemurs ("half apes") are still found in Tropical Africa and in Tropical Asia, but in Madagascar this group in the recent past developed extraordinarily. Within the human period there existed in Madagascar lemurs nearly as large as a man. Such remarkable forms are extinct now, as is also the gigantic bird of Madagascar, the Aepyornis, possibly the largest bird that this world has ever known, and the origin of the legend of the Rukh of the Arabian Nights. One of the most useful birds in Africa of the twentieth century is the Ostrich, which fortunately has been domesticated and brought into the service of man.

GOLD, DIAMONDS AND OTHER PRODUCTS

It was not, until 1884 that the wealth in gold of the Transvaal rocks was fully realized, and the gold industry centered in Barberton and Johannesburg was started on a large scale. Since then, the gold export of South Africa has risen to something like £36,000,000 (180,000,000 dollars) per annum. In the sixties of the last century, likewise, the existence of diamonds was made known in South Africa, and the working of diamonds brought immense wealth to that region and quite changed the history of the southern third of Africa. Within the last few years, however, diamonds have been discovered also in German Southwest Africa, in the south-western portion of the Congo basin, and in Liberia, on the west coast of Africa. Gold has also been discovered and worked in the north-eastern basin of the Congo and in Liberia. It has also been worked intermittently for several centuries in Bambara, in the basins of the upper Sengal and upper Niger. Another great source of wealth peculiar to Africa is the oil palm, the full importance of which is scarcely yet realized. The two distinct oils which come, the one from the kernel and the other from the husk of the nut, are not only of great value as food products for both man and beast, but they furnish the best material for soap, and for a great many other industrial products, including lubricating oils for machinery, and a vegetable fat for making butter. Other products of great future value in Africa will be timber and rubber from the forests and the plantations, the banana (which though not in its cultivated form native to the continent, has been established there for untold centuries), and maize, which, though introduced from America, has found a second home in Africa. Besides the ostrich also, Africa in many parts is a splendid field for horse and cattle breeding. The horses of North Africa are in great demand. So also are certain breeds of sheep and goat. Madagascar is celebrated for its cattle and apparently is free from the pest of the tsetse fly.

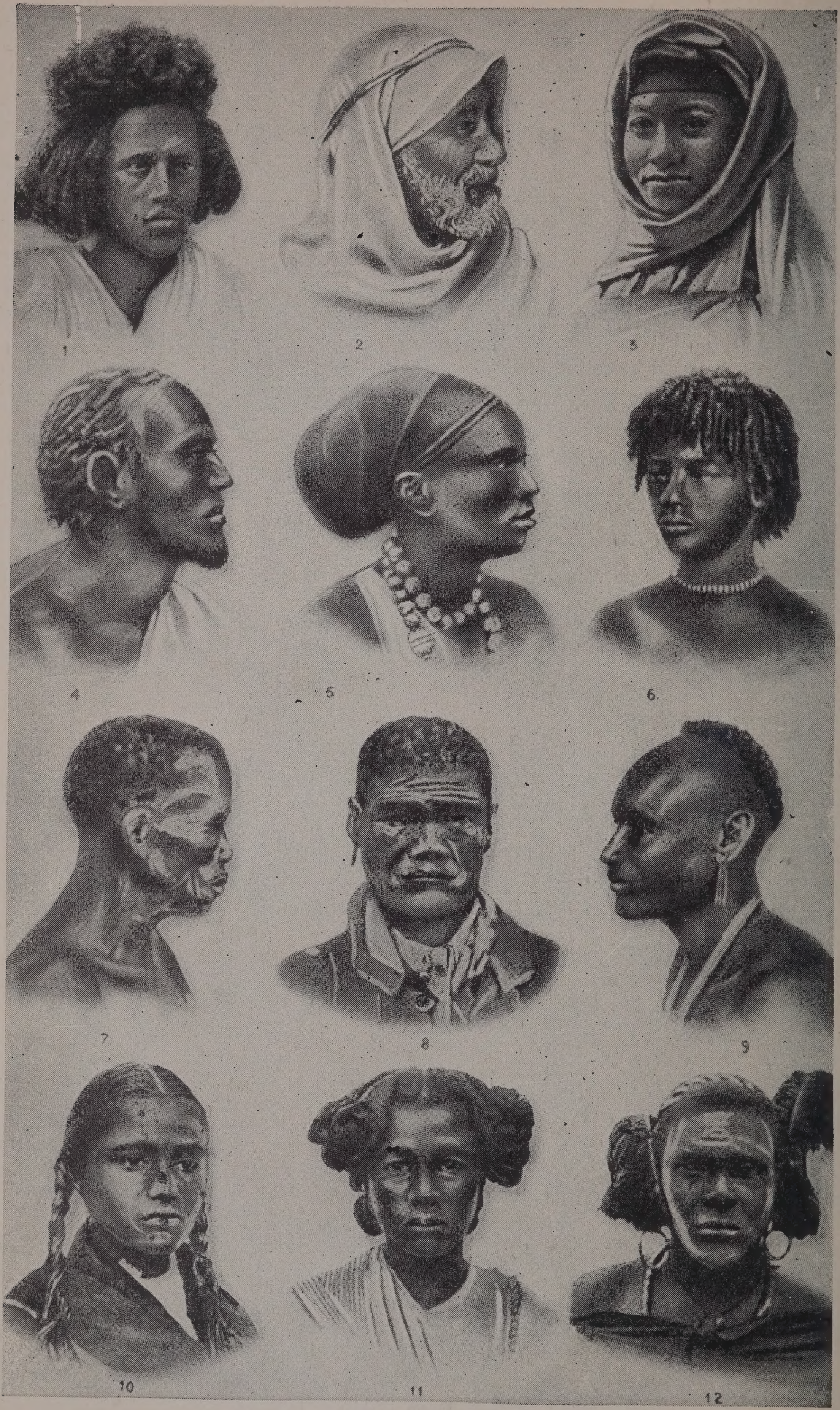
THE HUMAN POPULATION OF AFRICA

The total population of Africa at the present day is probably something like 151,000,000, and apportioned racially would consist of 120,000,000 Negroes and Negroids, 6,000,000 pure-blooded Europeans (absolute White men of Northern or Mediterranean stock), and 25,000,000 of handsome, physically well developed, but mentally rather backward, dark-skinned Caucasians—Berbers, Arabs, Egyptians, Galas, and Abyssinians. Quite distinct, from the true Negro is the Bushman of South Africa, a somewhat (but not always) stunted race, with a yellow skin, very sparse and tightly curled hair, and other peculiar physical features not ordinarily met with in the Negro, though sometimes occurring in the people of the Mediterranean basin. The Hottentot is nothing but an early hybrid between the true Negro and the Bushman.



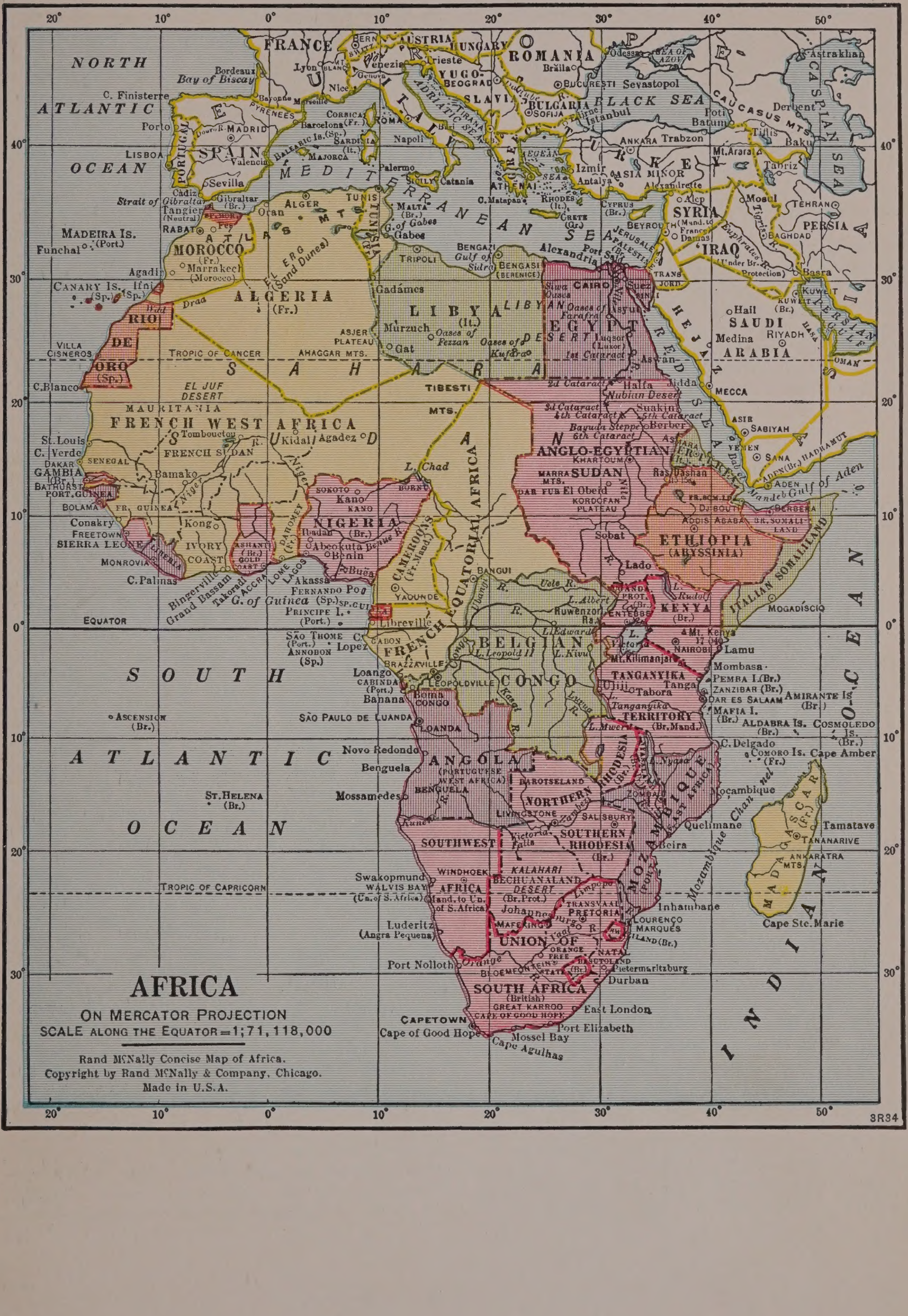
NATIVES OF AFRICA—PLATE I

1 Shiluk 2 Dinka 3 Woman of Porto Novo 4 Fulah Girl 5 Tamberma Man 6 Man of Bamum
7 Ama-ngqika 8 Waushagga Girl 9 Loango Girl 10 Girl of Kamerun 11 Pygmy
12 Woman of Lunda



NATIVES OF AFRICA—Plate II

1 Hadendoa 2 Bedouin 3 Biskra Girl 4 Midgan 5 Somal Woman 6 Wahuma Girl
7 Bushman Woman 8 Hottentot 9 Mukamba 10 Hova Girl 11 Sakalava Girl
12 Masai Youth


20°
10°
0°
10°
20°
30°
40°
50°
NORTH ATLANTIC OCEAN
Bay of Biscay
Bordeaux
C. Finisterre
Porto
LISBOA
PORTUGAL
SPAIN
MADRID
Valencia
Sevilla
Cádiz
Strait of Gibraltar
Gibraltar (Br.)
Tangier (Neutral)
RABAT
MOROCCO (Fr.)
Marrakech (Morocco)
Agadir
Ifni (Sp.)
MADEIRA IS.
Funchal (Port.)
CANARY IS. (Sp.)
RIO DE ORO (Sp.)
VILLA CISNEROS
C. Blanco
FRANCE
Lyon
Nice
Marseille
Bayonne
PYRENEES
Barcelona
BALEARIC IS. (Sp.)
MAJORCA
CORSICA (Fr.)
SARDINIA (It.)
ITALY
ROMA
Napoli
Palermo
SICILY
Catania
MALTA (Br.)
AUSTRIA
HUNGARY
Venezia
Trieste
YUGOSLAVIA
BEOGRAD
ADRIATIC SEA
TIRANA
ROMANIA
Brăila
BUCURESTI
BULGARIA
SOFIJA
GREECE
ATHENAI
C. Matapan
AEGEAN SEA
RHODES (It.)
CRETE (Gr.)
Odessa
SEA OF AZOV
Sevastopol
BLACK SEA
Istanbul
ANKARA
Trabzon
TURKEY
Izmir
ASIA MINOR
Antalya
Alexandrette
CYPRUS (Br.)
Aleppo
SYRIA (Mand. to France)
BEYROUTH
Damas
JERUSALEM
PALESTINE
TRANS JORDAN
IRAQ (Under Br. Protection)
Mosul
Baghdad
Basra
Euphrates R.
Tigris R.
PERSIA
TEHRAN
Tabriz
Tiflis
Baku
Batum
Poti
CAUCASUS MTS.
Derbent
Astrakhan
CASPIAN SEA
Mt. Ararat
KUWEIT (Br.)
PERSIAN GULF
SAUDI ARABIA
Hail
RIYADH
HASA
Medina
HEJAZ
Jidda
MECCA
ASIR
SABIYAH
YEMEN
SANA
HADHAMUT
ADEN (Br.)
Gulf of Aden
Bab el Mandeb
OMAN
RED SEA
MEDITERRANEAN SEA
ALGER
Oran
TUNIS
TUNISIA
G. of Gabes
Gabes
ATLAS MTS.
EL ERG (Sand Dunes)
ALGERIA (Fr.)
Draa
Gadámes
TRIPOLI
LIBYA (It.)
Murzuch
Oases of Fezzan
Ghat
ASJER PLATEAU
AHAGGAR MTS.
BENGAZI
Gulf of Sidra
BENGASI (BERENICE)
LIBYAN DESERT
Oases of Kufara
Alexandria
Port Said
CAIRO
Suez
Siwa
Oases of Farafra
Asyut
EGYPT
Luqsor (Luxor)
1st Cataract
Aswan
2d Cataract
Halfa
Nubian Desert
3d Cataract
4th Cataract
5th Cataract
6th Cataract
Suakin
Bayuda Steppe
Berber
KHARTOUM
ANGLO-EGYPTIAN SUDAN
MARRA MTS.
DAR FUR
El Obeid
KORDOFAN PLATEAU
Ras Dashan
ERITREA (It.)
FR. SOM. LD.
DJIBOUTI
BERBERA
BR. SOMALILAND
ADDIS ABABA
ETHIOPIA (ABYSSINIA)
ITALIAN SOMALILAND
MOGADISCIO
Sobat R.
Lado
TROPIC OF CANCER
SAHARA
EL JUF DESERT
TIBESTI MTS.
MAURITANIA
FRENCH WEST AFRICA
Tombouctou
FRENCH SUDAN
Kidal
Agadez
St. Louis
C. Verde
DAKAR
SENEGAL
GAMBIA (Br.)
BATHURST
PORT. GUINEA
BOLAMA
FR. GUINEA
Conakry
FREETOWN
SIERRA LEONE
Liberia
MONROVIA
C. Palmas
Bamako
Niger R.
Kong
IVORY COAST
Bingerville
Grand Bassam
ASHANTI (Br.)
GOLD COAST
Takoradi
ACCRA
LOME
DAHOMEY
LAGOS
SOKOTO
Kano
NIGERIA (Br.)
Ibadan
Abeokuta
Benin
Benue R.
Akassa
Buëa
CAMEROONS (Fr. Mand.)
G. of Guinea
FERNANDO PO (Sp.)
SP. GUI.
PRINCIPE I. (Port.)
SÃO THOME (Port.)
ANNOBON (Sp.)
L. Chad
BORNU
FRENCH EQUATORIAL AFRICA
BANGUI
YAOUNDE
Libreville
GABON
C. Lopez
BRAZZAVILLE
Ubangi R.
Uele R.
Congo R.
Loango
CABINDA (Port.)
Banana
Boma
CONGO
LEOPOLDVILLE
BELGIAN CONGO
L. Leopold II
Kasai R.
Lualaba R.
L. Albert
Ruwenzori Ra.
L. Edward
L. Kivu
UGANDA PROT. (Br.)
ENTEBBE
L. Rudolf
KENYA (Br.)
Mt. Kenya 17040
NAIROBI
L. Victoria
Mt. Kilimanjaro
Lamu
Mombasa
PEMBA I. (Br.)
ZANZIBAR (Br.)
DAR ES SALAAM
MAFIA I.
Ujiji
Tabora
Tanga
TANGANYIKA TERRITORY (Br. Mand.)
L. Tanganyika
L. Mweru
AMIRANTE Is. (Br.)
ALDABRA Is. (Br.)
COSMOLEDO Is. (Br.)
C. Delgado
COMORO Is. (Fr.)
Cape Amber
EQUATOR
SOUTH ATLANTIC OCEAN
ASCENSION (Br.)
ST. HELENA (Br.)
SÃO PAULO DE LUANDA
LOANDA
Novo Redondo
Benguela
Mossamedes
ANGOLA (PORTUGUESE WEST AFRICA)
BENGUELA
Kunene R.
BAROTSELAND
NORTHERN RHODESIA (Br.)
LIVINGSTONE
Zambezi R.
L. Nyasa
NYASALAND
ZOMBA
MOZAMBIQUE (PORTUGUESE EAST AFRICA)
Moçambique
Quelimane
Mozambique Channel
MADAGASCAR (Fr.)
Tamatave
TANANARIVE
ANKARATRA MTS.
Cape Ste. Marie
SALISBURY
Victoria Falls
SOUTHERN RHODESIA (Br.)
Beira
SOUTHWEST AFRICA (Mand. to Un. of S. Africa)
WINDHOEK
Swakopmund
WALVIS BAY (Un. of S. Africa)
KALAHARI DESERT
BECHUANALAND (Br. Prot.)
MAFEKING
TROPIC OF CAPRICORN
Limpopo R.
TRANSVAAL
PRETORIA
Johannesburg
Inhambane
LOURENÇO MARQUES
SWAZILAND (Br.)
Vaal R.
Luderitz (Angra Pequena)
Port Nolloth
Orange R.
UNION OF SOUTH AFRICA (British)
ORANGE FREE STATE
BLOEMFONTEIN
NATAL
BASUTOLAND (Br.)
Pietermaritzburg
Durban
GREAT KARROO
CAPETOWN
CAPE OF GOOD HOPE
Cape of Good Hope
East London
Port Elizabeth
Mossel Bay
Cape Agulhas
INDIAN OCEAN
3R34

AFRICA

ON MERCATOR PROJECTION
SCALE ALONG THE EQUATOR = 1:71,118,000

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POLITICAL DIVISIONS OF AFRICA

Scarcely any portion of Africa at the present day can be described as independent of European rule. The Empire of Abyssinia maintains a tottering independence which cannot last much longer, owing to the utter inability of the ruling race, the Abyssinians, to impose law and order throughout their ill-governed dominions. The little Republic of Liberia on the west coast of Africa was founded by white Americans as a refuge for American slaves who had gained their freedom a hundred years ago. It has not so far been much of a success as a governing power over the wild negroes of the territory proclaimed as "Liberian," and the government of the country is a good deal controlled and influenced nowadays by the American organizers lent by the United States. Not only is the whole of Africa controlled by Europe, but by *Christian* Europe; Muhammadan Turkey being excluded from any further interference in African affairs, since the Italian annexation of the Tripolitaine and the establishment of a British control in Egypt.

MARVELOUS OPENING UP IN RECENT YEARS

In the truly marvelous opening-up of Africa which has been taking place during the last twenty years, and more especially since the commencement of the present century, the great schemes and public works which most deserve mention in a brief record (beginning on the north and proceeding southwards) are the following:

The damming of the Nile at Assuan, at what is called the first (though it is really the last) of its cataracts. This operation, though it is leading to the submergence of the temples of Philae, will more than double its native population. For Egypt (compared to the rest of Africa) is a healthy land for Black, White, and Yellow. Give it a sufficient water supply in the way of irrigation and it will become one of the wealthiest regions, for its area, on the world's surface and one of the most habitable. What the ultimate consequences of this regeneration of Egypt under the British aegis will be, it is interesting to speculate. Certainly the prosperity of this land will far exceed the greatest altitude ever reached in population and civilization at the best period of the rule of the dynastic Egyptians—let us say, Egypt 1,500 years before the time of Christ; and if ever Egypt again is one of the great nations of the world the thanks of her people will be due entirely to the British nation which undertook its regeneration.

The Italians are commencing a similar work in the Tripolitaine, and once Italy has got effective control we may look with confidence to the restoration of the sparsely inhabited region between Egypt and Tunis to a state of prosperity such as it has not enjoyed since it ceased to form part of the Roman Empire. Wells will be dug and will tap the immense reserves of water underlying the surface of the Sahara. The French have really transformed Tunis from a semi-desert country to one of the most fertile and beautiful in the Mediterranean Basin. Algeria has more than twice the native population at the present day which it possessed at the time the French abolished the rule of the Turkish pirates in 1830–40.

A VAST SYTSEM OF RAILWAYS

The French are entirely revolutionizing conditions of life in Morocco, chiefly by means of railways. They have carried their eventual Trans-Saharan Railway from Oran on the coast to a distance of 700 miles south, into the desert, beyond the range of the great Atlas. In fact, what with the work of the Italians in Tripoli, the British in Egypt, and the French in the rest of North Africa, there will, before very long, be a continuous line of rail between Tangier through North Africa to Alexandria and Cairo.

The French also, once they are free from any reasonable dread of German invasion, will complete their Trans-Saharan Railway right across the Desert of Timbuktu, and joining with other railways already constructed or under construction, will eventually link up Tangier with Kano in Northern Nigeria, as well as the British, French and German colonies on the West African coast.

Tangier, which will certainly be the point of departure for these tremendous overland railway journeys through the once Dark Continent, constitutes at the present time a tiny internationalized state of Morocco, under the joint guardianship of Britain, France and Spain. It is, of course, only a few hours' steam from Gibraltar and the Spanish and Portuguese coasts. It is the Calais of Africa, and perhaps some day may be its most important city.

RECENT DISCOVERIES OF MINERAL WEALTH

The extraordinary rate at which railway building is now proceeding in Africa is justified commercially by recent discoveries of great mineral wealth. The tin and the coal of Nigeria; the phosphate deposits of Tunis; mineral oil in Somaliland, Egypt, and the Northern Sudan; gold, tin, copper, coal, petroleum, in North and Central Africa; haematite iron, lead, silver, in Morocco; phosphates, soda, copper, iron and gold in the Sahara Desert and the Egyptian Sudan; are, or will be, inducements for railway adventure in those regions, while in much of Central Africa, Angola, Nyasaland, Uganda, Kamerun, the Congo Basin and the forest regions of West Africa, the inducement for railway and road construction is often not mineral but vegetable; for these regions are producing ever-increasing quantities of rubber, coffee, cotton, tobacco, maize, peanuts, bananas, cocoa, palm-oil and palm-nuts; besides timber, cattle, hides and wax. One of the most interesting phases in the opening-up of Africa is the greatly increased application of the negro races to agriculture and horticulture on their own account. The cocoa of British West Africa is produced not by hired laborers or slaves for white planters, but by free natives working their own land. This is the case with regard to the immense ground-nut industry of French West Africa and the palm-oil and rubber of Southern Nigeria.

SIR HARRY HAMILTON JOHNSTON.

Afrikander (*ăf-rē-kän'der*), a name applied to whites of Dutch descent born in South Africa. The term is opposed to *Uitlander*, which signifies an outsider, or one born in another country. The Afrikander Bund was an organization among the Dutch in Cape Colony which aimed at the political independence of South Africa in Dutch interests.

Agamem'non, the leader of the Greeks in the Trojan war. He was the son or grandson of Atreus, king of Mycenæ, and the most powerful prince in Greece. He and his brother Menelaus married the two daughters of the king of Sparta, Clytemnestra and Helen. When the Trojan Paris carried off Helen, Agamemnon was chosen chief of the forces sent out for her recovery. At Troy, in the ninth year of the war, he quarreled with Achilles over two captive maidens, and almost ruined the Greek cause. After his return from the capture of Troy, he was murdered at a feast by his wife and her lover. His death was afterward avenged by his son Orestes. Agamemnon was worshiped in Sparta as a god.

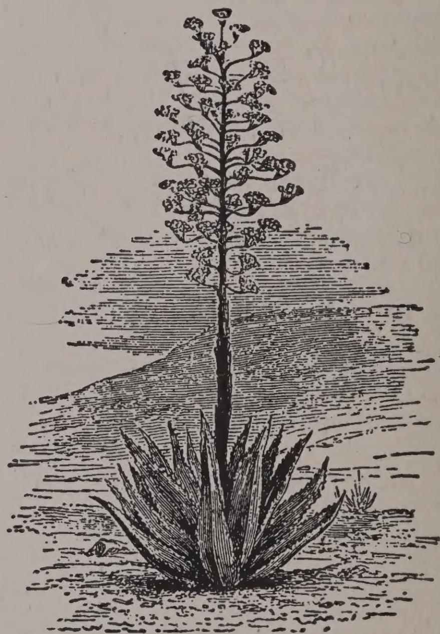
Agar'icus. The best known genus of mushrooms, one of whose species, *A. campestris*, is the common cultivated mushroom. The genus belongs to the *Basidiomycetes*, and the spores are exposed along the surfaces of radiating plates or "gills" under the cap or "pileus." See BASIDIOMYCETES.

Agasias (*ä-gā'sē-as*), a Greek sculptor of Ephesus, who probably lived about the fourth century. His celebrated work, called the *Borghese Gladiator*, was found in the ruins of Antium in the third century, and is now in the Louvre collection at Paris.

Agassiz (*ăg'a-sē*), **Louis Jean Rodolphe,** a distinguished naturalist, was born at Motiers, Switzerland, May 28, 1807. After years of study he began to write on scientific subjects. His reputation was made by his book, *Studies of Glaciers.* In 1846 he became professor of zoology and geology at Harvard College. He made explorations in Brazil and in the South Atlantic and Pacific oceans. Agassiz was not merely a learned naturalist, but a great force. He did much by public lectures and by teaching to make natural history popular. He trained many young naturalists who have carried out his methods. He founded the Agassiz Museum of Comparative Zoology at Harvard College. His *Methods of Study in Natural History* and *Contributions to the Natural History of the United States* are his most popular works. He died at Cambridge, Mass., Dec. 14, 1873.

His son, Alexander (1835-1910), also a distinguished naturalist and writer, was from 1874 to 1897 chief curator of the Museum of comparative zoology at Cambridge, Mass.

Ag'ate is a kind of chalcedony. Its colors are arranged in bands, but sometimes form spots, clouds and often stains like moss, when it is called the moss agate. By boiling the stone in a syrup and then in an acid the beautiful colors can be made brighter. Agates take a high polish and are cut into brooches, seals and bracelets, and used in mosaic work. They are found in Egypt, Germany, Scotland, South America, the United States and other parts of the world. In this country moss agates abound in Wyoming, Nevada and other points; small banded agates of great beauty are numerous on the shores of Lake Superior, and also in western Texas, where large specimens are plentiful. The agate marble is a name known to every boy, though most of these marbles are cheap glass imitations. Agate was prized by the ancients, mention being frequently made in history of onyx, the black and white banded agate, and of sardonyx, the red and white.



AGAVE

Agave (*ā-gā'vē*). A genus of plants of the amaryllis family, whose numerous species are peculiar to the warm and dry regions of America. Along with forms of cactus and yucca, agave forms the characteristic American desert vegetation. One of the species, the American aloe, has received the fanciful name of Century Plant, from the mistaken notion that it must be a hundred years old before it blooms.

It is a native of Mexico and Central America. In native soils the plant usually blooms in its seventh or eighth year, but in hothouses it rarely blooms until it is from 40 to 60 years old: whence arises the story that they flower only once in a hundred years. After flowering the plant dies down to the ground and new plants spring up from the roots. It has no stem proper, or a very short one, bearing a crowded head of large fleshy leaves, which are spiny at the edge. From the midst of these shoots up the straight, upright scape, twenty-four to thirty-six feet high, and at the base frequently a foot through, along which are lance-like flower branches, ending in clusters of blossoms often numbering 4,000 flowers.

Although agaves are decorative plants in the United States and Europe, in their native home in Mexico they are among the most useful plants. There they are called maguey, and are a regular farm crop and valued highly. Some of the species supply fiber which is used in making rope, cordage, matting, clothing, thread, hammocks, bagging, burlap and other coarse textile stuffs, and the old Mexicans used it to make a coarse paper. Its introduction on our arid western plains is highly recommended, for it will grow in the dry lands of Texas, New Mexico, Arizona and southern California. When pasturage is scarce the leaves are cut up and fed to cattle. From some of the species soap is made, while the two most common Mexican drinks, pulque and mescal, are obtained from still others. When the young flower-bud is cut out, the sap keeps on flowing into the cavity. This juice is quite sweet. It is gathered daily and fermented, and becomes the great Mexican drink known as pulque. It is milky, sour and bad smelling, looking like thin buttermilk, and has a rank taste; yet even Americans soon find it agreeable and refreshing. A distilled liquor is also made from it. The unfermented maguey, called honey-water, is used as a substitute for milk.

Agesander (*ȧ-jĕ-săn′dĕr*) **of Rhodes,** See LAOCOÖN.

Agesilaus (*ȧ-jĕs-ĭ-lā′ŭs*), one of the most warlike of the kings of Sparta. Though not the lawful heir, he became king in 398 B.C., and reigned thirty-eight years. He was small, lame and mean-looking, but had a wonderful amount of energy. His first war against the Persians, whom he defeated in Asia Minor, led to his forming the project of entering the heart of the Persian Empire, which Alexander the Great afterward carried out. But he had to give up the attempt in order to defend Sparta against her enemies at home. In the later years of his life Sparta lost her power, but he remained faithful, and devoted his fortune to her service. He died at the age of eighty on the coast of Africa, while returning from a last effort against his enemy, Persia.

Agincourt (*ȧ-zhăn-ko͞or′*) a village in the north of France in the Department of Pas-de-Calais. Historically it is noted as the scene of the battle between the English under Henry V and the French under the Duke D'Albert, commanding for the Dauphin Charles, Oct. 25, 1415. Having driven the French cavalry by strategy into a swamp, Henry V turned his archers upon them and almost annihilated them. The fugitives threw the army into confusion, and the battle of three or four hours ended in a terrible defeat for the French. More than 10,000 French were killed, including many princes and nobles, while the English lost only 600. This decisive battle so crippled the power of France that Henry V soon had control of the entire kingdom.

Agra (*ä′ grä*), a city in the United Provinces of Agra and Oudh. It is an ancient city situated on the Jumna River about 139 miles from Delhi. Its narrow streets are lined with buildings, often several stories high, constructed of red sandstone. Government offices are situated here. Although Agra contains many structures of architectural beauty its most outstanding edifice is the Taj Mahal, the finest piece of Indian Mohammedan architecture in the East. The mausoleum was constructed by the Emperor Shah Kehan in 1632. It is a domed structure built of white marble inlaid with precious gems.

Agra has developed an extensive trade in cotton, tobacco, salt, grain and sugar. Its chief manufactures are shoes, gold lace and Mosaic work. In 1931 the population was 229,764.

See OUDH; TAJ MAHAL.

Agricola, Cnæus Julius, a Roman general, was born in the south of France in 37 A.D. He was made governor of Aquitania by the Emperor Vespasian, then elected consul, and later given the province of Britain to govern. He spent seven years there, completing the conquest of the island. He built a chain of forts as a defense against the northern tribes, and was the first Roman to send his fleet around Britain, proving it to be an island. He introduced Roman customs and the Roman language. He was recalled by the Emperor Domitian, who was jealous of his popularity. He died in 93 A.D. His life has been written by his son-in-law, the historian Tacitus.

Agricultural Adjustment Administration "AAA," an organization created for the purpose of administering the Agricultural Adjustment Act of May 12, 1933. According to Henry A. Wallace, Secretary of Agriculture, the purpose of the Act is to "subdue the habitual anarchy of a major American industry and to establish organized control in the interests, not only of the farmer but of everybody else."

The Administrator of the "AAA" is Chester C. Davis who succeeded George N. Peek in this position on December 11, 1933. There are seven directors of divisions in the "AAA" and sixteen chiefs of sections. Under the Agriculture Adjustment Act the Secretary of Agriculture is authorized:

"1. To arrange with individual farmers to reduce their acreage or production by a specified amount, and to compensate them in return either by paying rental or by direct benefit payments.

2. To enter into marketing agreements with processors and others to reduce wasteful and price-depressing competition, in order to give the farmer better prices.

3. To arrange with cotton growers to reduce their crop. Those cutting acreage a given amount can be given an option contract for an equivalent amount of cotton from the stock now owned by the Federal Government. If cotton prices rise, the grower may sell at a profit; he will not be liable for loss incurred in holding this cotton.

4. To include in the administration of the Act any or all of the following basic commodities—wheat, cotton, hogs, field corn, rice, tobacco, milk, and milk products.

5. To make payments to farmer reducing acreage from a processing tax on these commodities. (This tax will eventually be passed on to consumers through an increase in retail prices.)"

The duty of the "AAA" is to make compensatory payments to supplement the market returns of the farmer; to adjust their production of certain basic agricultural commodities. Compensatory payments are made only to those farmers who do adjust their production. The "AAA" also undertakes to establish marketing agreements among processors and distributors, agreements which are enforced by licensing provisions when necessary. Such agreements assure a fair price to the producer as well as the consumer.

Agricultural Experiment Stations, institutions established by the various governments throughout the world for the purpose of fostering the development of agriculture through scientific and practical information on the theory and practice of that industry and the adaptation of that knowledge to local needs. These stations are frequently associated with an agricultural college. The governments of France, Germany, Belgium, Holland, Austria, Hungary, Denmark, Sweden, Norway, Switzerland, Soviet Russia, Italy, Japan, the British Empire and the United States to-day maintain such experiment stations.

The first experiment station in the world was established in 1843 at Rothanstead by Sir John Lawes. Such institutions in the United States were modelled after those of Europe. The first stations established in America were those at Wesleyan University in Middletown, Connecticut, established by the State of Connecticut, and at the University of California at Berkeley, established by the University. Both of these stations were founded in 1875.

In 1887, under the Hatch Act, an appropriation of $15,000 was granted each state in the Union annually for original research and agricultural experiments. The Federal Department of Agriculture was established by Act of Congress in 1889. An office of Experiment Stations was included in this department which has since controlled the funds expended on these stations in the United States. This office also administers the stations in Alaska, Hawaii, and Puerto Rico. This department issues a monthly journal called the *Experiment Station Record.* To such states and territories as support an agricultural college the Federal Government makes annual grants in aid. Many states also make special grants. The Federal Office co-operates with the Experiment Stations in making such investigations as Congress may from time to time desire. Joint research has also been made in co-operation with foreign agricultural stations. In 1930 more than 7,000 research projects in agriculture and rural life were carried on by the Experiment stations in the United States and its possessions.

See AGRICULTURE.

Agriculture comprehends the tillage of the soil, the cultivation and harvesting of crops, the rearing, breeding, feeding and management of the various domesticated animals, and the manufacture of numerous products of the farm into commodities suitable for home use or for commercial purposes. No other of the arts antedates this, which not only feeds and clothes the world but contributes in ways innumerable to its wealth and welfare.

History. Wherever husbandry has been in highest esteem there has been found a people advanced in civilization. Apart from the present-day advantages of knowledge that centuries of research and investigation have given, and those contributed by agricultural chemistry, new and improved machinery and modern transportation facilities, the husbandmen of some of the nations of antiquity were in many essentials so advanced as to make comparison of their practices with those of to-day appear by no means discreditable. The ancient Egyptians, we are informed, knew the wisdom of crop rotation, were skilled in their methods of suiting these to soils and seasons, and even the rearing of poultry hatched by artificial incubation was not uncommon. The exceeding care in their execution of deeds of conveyance, minute description of both the seller and realty and explicitness of terms warrant the belief that land was held in earliest times at high values as a means of producing wealth. Farming operations were overseen by superintendents, shelter provided for beasts and vehicles, and records kept of accounts. The Scriptures abound in allusions to flocks and herds and the produce of the field.

Palestine afforded an early example of intensive farming, where small holdings were the rule. The limited farms, it is recorded, produced abundantly, and their fertility was maintained by judicious cultivation and management. A mixed husbandry obtained, and the fields were enriched by the application of manures. Ancient Romans were among the foremost of their time in agricultural pursuits, and problems of irrigation, tillage and fertilization were among those which commanded their attention. Cato, Pliny and others expounded doctrines that in the present century are being promulgated by our most learned teachers. They recommended rotation, such, for instance, as having wheat follow legumes, because, as Pliny said, they enriched the ground; also the keeping and feeding of live stock was advocated. To-day it is quite generally recognized that any rational system of farming includes these usages.

During the Middle Ages agriculture in Europe under barbarian conquerors was neglected, and those engaged in it held in contempt; its peaceful pursuits were largely abandoned by the landowners for war and the chase, and every one not of the nobility was regarded as a slave, subject to the will of a master. This resulted in a most deplorable condition of labor, and retarded progress; but the end of the feudal system marked the beginning of a new era, and renewed attention was given to tillage. By the end of the seventeenth century it was probably as skilfully practiced as ever before, and the prestige of the husbandmen had been regained.

The eighteenth century was one notable in its relation to the world's agriculture. Jethro Tull, an Englishman, introduced the method advocated by him of sowing crops in drill rows, which admitted of their cultivation, and a four-crop rotation that has been followed more or less strictly to the present time is credited to Lord Townshend. Robert Bakewell, another Englishman, revealed the methods by which all breeds of farm live stock have since been improved, i. e., by judicious selection, mating and feeding, as illustrated in the Leicester sheep which he developed, and in the cattle known as Longhorns which he improved. By the same methods the brothers Colling produced from the native Teeswater cattle the famous breed now known as the Shorthorn, and Herefords were similarly improved or developed by Benjamin Tomkins. These were the pioneers in this work. Thomas Bates, Thomas Booth and others became famous as improvers of Shorthorns, as did Amos Cruickshank, a Scotchman, later, and through the latter's breeding came some of the greatest Shorthorns of the last quarter of a century.

In the light of present-day knowledge and practices agriculture differs much in our own from that of earlier times. Chemistry, invention of new tools and machinery and improvement of the old, better methods of tillage, and superior educational facilities raising the general plane of intelligence are among the more potent forces that have effected the change. The most far-reaching developments have been accomplished during the past century, and from the multitude of scientists and investigators now delving into the mysteries of the soil and of animal and plant life, much more of value is likely to be evolved. Agricultural implements and machinery were developed and perfected to their present efficiency only in recent times, and there is nothing to suggest that the end in their improvement is near; the rapid extension of railroads and improved methods of travel and transportation are the work of the past few years, and the institutions on every hand for agricultural education are also the products of modern times.

Agriculture in the United States. In the United States there has been no lack of appreciation of agriculture. The chief executives from Washington to Roosevelt have been strong advocates of its promotion. In his first annual message to Congress, in 1790, Washington urged its advancement by all proper means. Many of his later messages and writings contained discussions of the country's agriculture, which he considered of primary importance with reference either to the individual or national welfare. In his last message to Congress he said: "In proportion as nations advance in population and other circumstances of maturity this truth becomes more apparent, and renders the cultivation of the soil more and more an object of public patronage." In 1932 Franklin D. Roosevelt in his campaign for election to the Presidency declared that recovery from the economic chaos, which had enveloped the country since 1929, could only be accomplished by national social planning, planning for industry and agriculture.

The North American Indians are known to have cultivated the soil in a primitive way before the coming of the white man to this continent. Corn and tobacco constituted their chief crops. A crude system of hand irrigation was employed, a system which was widely used by Pueblo Indians. They fertilized the soil with fish and shells. The pioneer American farmers learned a great deal from these Indians. In spite of the knowledge gained from these primitive farmers and their own methods which they practiced ever so perseveringly, these pioneers oftentimes failed chiefly because of their inability to adapt themselves to the new conditions of soil and climate. Besides the natural wildness of the country to be tamed and subdued, the vicissitudes of their environment were many and hazardous. Wild beasts and unfriendly Indians and the absence of adequate facilities all retarded the country's development. For approximately two centuries forming in America was confined to a comparatively narrow area adjacent to the Atlantic. The first of the farmer's implements were most crude and his practice wasteful. The conserving of the land's fertility was ignored; such vast areas, uncultivated and unclaimed, encouraged no other practice. When a field was exhausted it was abandoned and another cleared and tilled. Buildings, equipment and other necessities were had at the expense of the soil. Thus an indifference to the maintaining of the soil's fertility was inherited by succeeding generations. One of the greatest problems of modern America has resulted from this indifference. It has been necessary to remedy the evil done in those early colonial days and inaugurate a system of agriculture which tends to maintain the fertility of the soil. Agricultural chemistry in recent years has been most helpful in this direction. It required a full century for Americans to realize that the productivity of their land was limited, and that the deep fertile soil could become exhausted.

At the close of the eighteenth century the great percentage of the population in the United States were farmers. The farms were comparatively small in area and tilled sparingly and mostly for self-support. Lack of adequate transportation facilities made markets unavailable, and hence there was little incentive to produce more than was required for home consumption. Inefficient equipment was also a barrier to any surplus that might have been desired. Under these conditions none but the most simple methods were employed and but scant attention given to cultivation. Providence was the main reliance. In those days it was commonly said that "anybody can farm," and in truth nearly everybody did. With a population the greater part of whom raised their own supplies, and the exporting of any surplus being practically impossible, the situation of the American farmer about the close of the eighteenth century was one that created little enthusiasm. Cotton, corn, and tobacco were the great products of this day. In 1793, with the invention of the cotton gin by Eli Whitney cotton-growing increased in importance and resulted in an influx of slave labor. Well planned farming was not practised.

In the nineteenth century the discoveries of science led to the belief that chemistry would greatly promote the art of agriculture. New implements were sought, improved methods were adapted, and a general awakening marked the first great stride in a progress that has become the admiration of the world. Agricultural development was greatly stimulated by scientific research, improved transportation methods, improved agricultural machinery, the abolition of slavery, and the opening of new lands. It was during this century also that governmental agencies were established to further the progress of agriculture.

As the population increased and the frontier was gradually pushed further into the interior of the continent, the pioneers in the westward movement were required to adapt themselves to still other conditions and to solve new problems. Each new outpost of civilization was in a sense an agricultural experiment station. The vast expanse of country presented a variety of soils and climates, and to learn what crops and methods were best adapted to the differing conditions was tedious and expensive. This gave birth to the state agricultural experiment stations, and with the help of such institutions many obstacles have been overcome and the development of the country steadily expanded.

The first society for the promotion of agriculture in the United States was organized in 1785. Others followed in rapid succession and to-day nearly every community has its agricultural association. Agricultural fairs have been helpful educators, and nearly if not all the states have boards of agriculture or similar organizations supported with public funds for the purpose of advancing the farming interests. From these are issued reports, bulletins and other useful publications which are usually distributed free.

Modern Implements. It is a far cry from the old-time forked stick for stirring the ground to the modern steam plow, or from the flail to the twentieth century thrashing, but these improved implements have been brought to the present perfection in recent years. The distinction of providing the first agricultural implements that were both labor-saving and time-saving in quality belongs to America. The invention of those implements adapted to the needs of the American farmer has been a potent factor in developing the country's agriculture. In 1794 Eli Whitney of Massachusetts invented and patented the cotton gin. Prior to this it had been necessary to separate the cotton fiber from the seed by hand. Whitney's machine made this process faster and less tedious. To-day two types of the cotton gin are in use, the saw gin and the roller gin.

The first improved plow was introduced by Charles Newbold and Jethro Wood. The first successful reaper was produced by Cyrus H. McCormick. Improved harrows, spreaders, planters, cultivators, and rakes have been of inestimable value to the farmer. Gasoline engines and tractors are modern sources of power and motivation. The caterpillar type moves by means of two continuous, revolving chain pads, in somewhat the same manner as a belt revolves on two pulleys. The many modern agricultural implements now made available to the farmer, have economically supplanted the slow and tedious hand work of the early colonial farmer. In recent years the farmer has enjoyed the many benefits afforded by electricity and its widespread uses. Countless number of agricultural implements and machinery are now operated by electricity.

Science and Agriculture. Land productivity has been greatly increased within recent years by the benefits derived from an intensive study of chemistry, bacteriology, botany and physics in relation to agriculture. One of the most outstanding developments in the field of agriculture has been that of soil improvement. Soil fertility has been restored by an extensive use of fertilizer, which has been subjected to chemical analysis, and crop rotation. Progress in agricultural chemistry is assisting to a constantly widening development in agriculture. It has taught the composition of soils, whereby their adaptability to certain crops is shown. It has taught the composition of plants, thus determining their relative values in compounding food rations of greatest excellence at minimum cost. It has also tended to the development of new crops, and improved in various ways those already staple. Great strides have been made in beneficially changing the chemical properties of plants, especially in recent years. Plants, like animals, can be modified and improved by selection and breeding, and this is a work now employing the minds of many of our foremost agricultural authorities.

Various insects and fungus have been brought under control by the scientific use of insecticides and fungicides. Improved storage, transportation and refrigeration facilities have been of inestimable value in the development of agriculture. Much remains to be accomplished, however, and although rapid strides have already been made in agricultural methods there is still a vast store of improvement not only possible but necessary.

Live Stock Industry. An astounding advancement has been made in stock breeding which has resulted in the selective breeding of high-grade stock. All breeds of domesticated animals have been greatly improved in the past century, and the methods of feeding and care have kept pace with the advancement in other lines. Much earlier maturity in meat-producing animals is one of the great improvements attained, as by it increased profits are derived, the feeding period is comparatively shortened, and the investment can be turned oftener. It has been fully demonstrated, too, that far greater gains for given quantities of feed are made in the earlier stages of an animal's growth. The study of animal nutrition has resulted in valuable developments for farmer and stock-raiser.

On January 1, 1933, the United States Department of Agriculture estimated that in the United States the total number of livestock was 194,619. Of this total horses numbered 12,163; mules, 4,981; cattle (including calves as well as milk cows), 65,129; sheep (including lambs), 51,630; swine, 60,716. The various breeds of cattle have been greatly improved for their specific uses, as evidenced by the increased milk flow from dairy cows and in the superior flesh-forming and fattening propensities of the beef breeds. The live stock industry has increased greatly in importance in the last half century.

Crop Acreage. On July 1, 1932, the United States General Land Office reported a total of 173,318,246 acres of public lands unappropriated and unreserved. The gross income from farm production in this same year was estimated at $5,240,000,000. The gross income from all crops in 1932 was $2,282,000,000. The farm population on January 1, 1931, was estimated at 27,430,000. The total number of farms was reported as 6,288,648 of which 3,568,394 were operated by farm owners, 55,889 by farm managers, and 2,664,365 by tenant farmers.

The principal cereal crops of the United States are corn, wheat, and oats. In 1932 there were 107,729,000 acres of corn which yielded 2,908,045,000 bushels; 55,177,000 acres of wheat yielding 726,831,000 bushels, and 41,244,000 acres of oats with a yield of 1,242,437,000 bushels. The chief wheat-growing States of the Union are North Dakota, Kansas, Montana, Nebraska, Washington, South Dakota, Illinois, Oklahoma, Idaho, Ohio, Indiana, Oregon, Colorado, Minnesota, Pennsylvania, and Michigan.

Corn is grown in every state and territory, but in recent years the six states of Illinois, Iowa, Nebraska, Missouri, Indiana and Kansas have yielded the majority portion. These states raise nearly sixty per cent of the product of the nation. A great amount of the corn grown in the United States is used as live stock feed. Its commercial uses have been largely increased in late years, however, and it is important in the manufacture of such commodities as alcohol, starch, glucose, cellulose and oils for various uses, and the newer products have resulted in increasing its price.

Farming in the United States is being reduced to such a science that the likelihood of crop failure is gradually becoming less. Haphazard methods are replaced by scientific practices that accurately lead to probable results that are known before-hand. It is no longer the drudgery it once was, and the environments of the farmer of to-day are vastly changed for the better from those of the preceding generation. The industrial and social conditions of the farmer have been greatly improved. An enlarged prosperity provides for the modern conveniences in his home, and the situation of the more progressive present-day farmer is one of increased comfort and ease over that of the farmer of early America. The economic chaos into which the world was flung in 1929 has taken its toll in the agricultural industry as in other fields of endeavor. Federal relief has been directed towards relieving the situation of the farmer and towards regulating crop production.

See AGRICULTURAL ADJUSTMENT ADMINISTRATION; AGRICULTURAL EXPERIMENT STATIONS; AGRICULTURE, UNITED STATES DEPARTMENT OF; MEAT PACKING; WHITNEY, ELI.

Agriculture, United States Department of, a department of the Federal Government which was formally established in 1889. Small appropriations had been made by the National Congress as early as 1839 for the voluntary distribution of seeds. After 1854, however, a special continuous grant was made to cotton growers for agricultural work. A bureau was established in 1862 consisting of a Commissioner of Agriculture, an entomologist, a chemist and a botanist. This bureau functioned as a branch of the Department of the Interior.

By Act of Congress, February 11, 1889, the Department of Agriculture was created and its Secretary made a member of President Cleveland's Cabinet. The first Secretary of Agriculture was Norman J. Colman. The duties of this office are to promote agriculture, to supervise and control the work of the Department, and to formulate the policies of its branches.

In 1889 there were but four bureaus in the Department: the bureau of plant industry, animal industry, chemistry, and soils. In 1891 the Weather Bureau, formerly a branch of the War Department, was transferred to the Department of Agriculture. The Department has extended its activities considerably since that year and to-day includes the following bureaus and offices: *The Weather Bureau; Bureau of Animal Industry; Bureau of Chemistry and Soils; Bureau of Biological Survey; Bureau of Entomology; Bureau of Plant Industry; Bureau of Biological Survey; Bureau of Dairy Industry; Bureau of Agricultural Economics; Bureau of Public Roads; Bureau of Home Economics; Forest Service; Plant Quarantine Administration; Food and Drug Administration; Grain Futures Administration; Agricultural Engineering; Office of Experiment Stations.*

According to the Act of Establishment by which the Department of Agriculture was created, its duties are "to acquire and diffuse among the people of the United States useful information on the subject connected with agriculture, in the most general and comprehensive sense of that word, and to procure, propagate, and distribute among the people new and valuable seed and plants."

See AGRICULTURE ADJUSTMENT ADMINISTRATION; AGRICULTURE; FOREST SERVICE; SIGNAL SERVICE.

Aguilar (*ä-gê-lär'*), **Grace,** an English writer, was born in 1816 at Hackney, near London, the daughter of a Jewish merchant. She became popular chiefly as a story writer for girls. She died in 1847. Among her works are: *The Magic Wreath* (1835); *Spirit of Judaism* (1841), and *The Jewish Faith* (1846).

Aguinaldo (*ä-gē-näl'dō*), **Emilio,** a distinguished Filipino insurgent leader, was born in 1872 near Cavité, Luzon Island, of mixed European and Mestizo (native half-breed) descent. He was educated by a Jesuit priest, and studied medicine in Manila. In 1896 he became mayor of Cavité. At a later date he led the anti-Spanish revolt. Discouragement soon swept over the insurgents and Aguinaldo with the other leaders accepted terms from Spain, involving their expatriation to Hong Kong. There Admiral Dewey found him at the outbreak of the Spanish-American War. Aguinaldo agreed to take up arms once more against Spain, and with his comrades received passage on the dispatch boat *McCulloch.* They landed in Luzon, renewed the insurrection, besieged Manila and captured 5,000 Spaniards including the family of the Spanish captain-general. This achievement further aroused the ambition of Aguinaldo. In June, 1898, the insurgents set up a provisional government with Aguinaldo as president. When peace was declared between the United States and Spain, he refused to recognize the treaty and assumed active hostilities against the United States. He attacked the American lines on February 4 and 5, 1899, proclaiming war against the United States. For over a period of more than two years he fought against its forces in various parts of the Tagal province. Aguinaldo and his immediate following were entrapped on March 23, 1901, at Palanan, and he was taken prisoner to Manila by General Frederick Funston. There he took the oath of allegiance to the United States and issued a manifesto to the Filipinos acknowledging and accepting the sovereignty of the United States. Other leaders fled or were killed but Aguinaldo was enabled to remain in the islands by retiring from public life, as his compromise ended the Revolution. Since that time he has lived quietly and peacefully in Manila, where his bravery is a tradition. From being a leader of insurgents against the Spaniards who held the peasants in serfdom, he has come to be a landlord himself over great estates. He is out of touch with the world, although involved in the island intrigues. He still holds his plan of a republic of forty years ago as an ideal.

Ainu (*ī'no͞o*), an aboriginal Japanese race of Caucasian stock now confined chiefly to Yezo, the Kurile Islands, and the southern part of Sakhalin. They were probably the first inhabitants of Japan, and during ancient times lived in the heart of the Japanese archipelago and exercised considerable influence on the Japanese, who nevertheless treated them almost as barbarians and drove them to their present retreat in the northern sections of the country. At present they number about 15,000. They are short in stature, stoutly built, and hairy. Their chief occupations are hunting and fishing. Their religion is a primitive nature worship, although recently many of them have accepted Buddhism, while a few have become converts to Christianity. The Rev. John Batchelor, a missionary to the race, translated the New Testament into the native tongue, and later published a grammer and dictionary, in the Ainu language. The years have changed the opinion of the Japanese in regard to the mental inferiority and backward civilization of the Ainus, and in recent times the Japanese have been blending with the Ainus. As a race, the Ainus appear to be rapidly drying out.

Air, the compound of gases which constitute the substance of the atmosphere in which we live. It is invisible, and has neither taste nor smell, but we know that it is all around us for we take it into our lungs with every breath and it becomes our most important food. It has weight, which we do not feel because of the air and other gases within us that exert an equal outward pressure. Upon every square inch of the earth's surface there rests a weight of about fifteen pounds of air, so that upon the body of a medium-sized man the air presses with a force equal to thirty thousand pounds. Air may be compressed or packed closely into smaller space than it usually fills. Thus, if a tumbler is pushed down, bottom upward, under water, the water will rise up inside the tumbler and press the air into smaller space. But as the tumbler is brought back to the surface the air again becomes as rare as the surrounding atmosphere, showing that it is elastic. The weight of the atmosphere makes the lower air so much denser than the upper air that one-half of the whole atmosphere is squeezed into a belt around the earth about three and one-half miles in thickness, while the upper half extends more than forty miles. Air is made up of about 78 parts by volume of nitrogen, 21 of oxygen and one of argon, in 100 parts, and with it is always mixed a variable quantity of water-vapor, which amounts to about one per cent by volume on the average. It contains also about $\frac{1}{3000}$ of carbon dioxide and minute quantities of several other gases, including helium, neon, krypton and xenon, which are inactive elements resembling argon. Oxygen is the element that is necessary to animal life, while carbon dioxide is required by plants. On the other hand, animals produce carbon dioxide while plants give off oxygen, so that each supplies the other, and the composition of the air is kept nearly constant. There is air also dissolved in water, and by the same double process fishes and sea-plants keep the air pure. In the cities the air is less pure than in the country, as there are more people to breathe it and fewer plants to supply oxygen. The gases of combustion and decay, which produce much carbon dioxide, also tend to contaminate the air. In a room the breathing of a number of persons will soon make the air unwholesome if the ventilation is not good. The gas, carbon dioxide, which is commonly called carbonic acid, is often called a poison: but it is not poisonous, although the presence of a large quantity of it interferes with breathing, and if enough is present it may cause suffocation. Carbon monoxide, the gas that burns with a pale-blue flame at the top of coal fires and is present in illuminating gas, on the other hand is a deadly poison. If this escapes unburned into the air of a room, the results may be very serious.

Air Brake. See Brakes.

Air Gun, a weapon for shooting bullets or other projectiles by means of condensed air. The air is forced into a vessel, usually in the stock, by means of a condensing syringe. When the finger touches the trigger, the air reaches into the space behind the bullet and drives it out of the barrel, and when the finger is taken away the vessel is again closed. Thus several shots may be fired, but with less force each time. At its greatest, the force is not equal to an ordinary charge of gunpowder.

Air Plants. Those plants which obtain all their food materials from the air. See Epiphytes.

Air Pump, an instrument used either to compress air in a closed vessel or to exhaust the air from a closed vesel. When used for the former purpose it is generally known as a "force pump," and when used for the latter purpose it is frequently called a "vacuum pump."

Air pumps, like other pumps, consist essentially of a cylinder fitted with a piston and two valves. The simplest of those which are used for compressing air is, perhaps, the ordinary bicycle pump illustrated in Fig. 1. Here the piston is provided with a more or less flexible leather collar which allows the air to pass down around it as the piston is lifted. But on the down stroke of the piston this leather collar acts as packing and prevents the air from passing up. Hence this one part acts as both piston and valve.

A second valve, V2, at the bottom of the cylinder prevents the air in the tire from getting back into the cylinder during the upstroke of the piston.

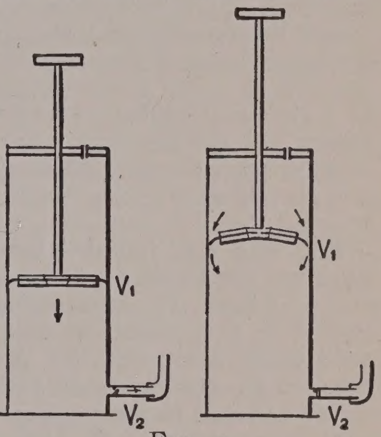


Fig. 1

SINGLE-ACTING BICYCLE PUMP

The vacuum pump is built upon exactly the same principles as the force pump, only the direction in which the valves open is reversed.

The first artificial vacuum was produced by Otto von Guericke, about 1650, with a pump similar to an ordinary lift-pump used in wells, except that instead of pumping the air out of an open vessel, such as a well, he pumped it out of a closed vessel.

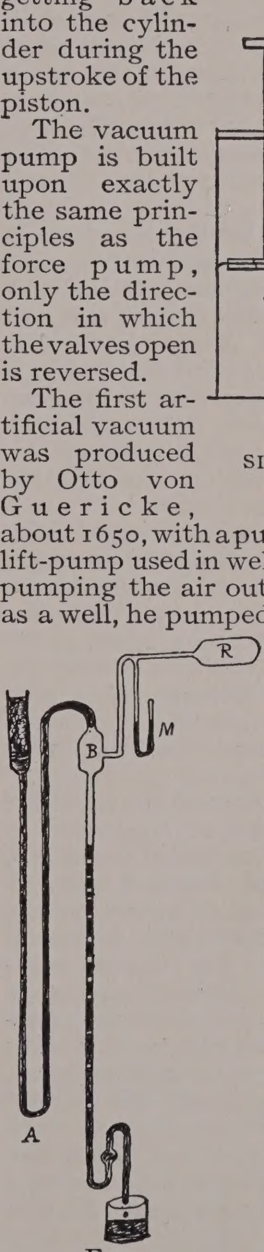


Fig. 2

SPRENGEL AIR PUMP

The immense improvement which has recently been made in the construction of air pumps, especially by the introduction of valves which open automatically, can be seen from the fact that Guericke's pump required four able-bodied men to operate it. A modern air pump is easily worked by one hand.

Ordinary vacua are thus produced by a piston working in a brass cylinder; but when it comes to "high vacua," such as those employed in the incandescent lamp and in X-ray bulbs, a much more perfect instrument is required. Here it is necessary to replace the ordinary cylinder by a mercury column in a glass tube.

In Fig. 2 is given a diagram of the best of these mercury pumps, the one devised by Sprengel.

The supply of mercury is contained in the reservoir on the left. It flows over into the bulb B, where it falls in drops into the long tube on the right. These drops entrap between them the air in B. The mercury which runs out is collected and poured back into the reservoir on the left. In this manner practically all the air can be removed from the bulb B, and hence from any vessel R, which may be connected with B. At M is a manometer which indicates the pressure in the Vessel R, which is being exhausted.

A pump of this type is capable of producing a vacuum in which the pressure is only 100,000,000th of an atmosphere.

Aix-la-Chapelle (*ĕks-lă-shă-pĕl'*), or **Aachen**, a city of Rhenish Prussia. It is situated about thirty-nine miles from Cologne in the center of a rich coal region. The principal manufacturers are needles and pins, chemicals, wool fabrics, soap, cement, crockery and cigars. The city is noted for its health-giving mineral springs.

The city was founded by the Romans. It contains the tomb of Charlemagne who died there in 814. Three important treaties were signed in this historical city: the Treaty of 1668 which concluded the War of Devolution between France and Spain; the Treaty of 1748 which brought to a close the War of the Austrian Succession, and the Holy Alliance of 1818. During these years more than 100,000 inhabitants dwelt in Aix-la-Chapelle. In 1932 the population was estimated at 155,816.

A'jax was the son of Telamon, king of Salamis, and next to Achilles in warlike strength. He led the men of Salamis to Troy in twelve ships, and was called the bulwark of the Greeks. At the death of Achilles, Ajax, as the bravest of the Greeks, claimed his armor, but it was given to his rival, Ulysses. Ajax soon became insane and killed himself. Sophocles tells the story of his madness and death in his tragedy *Ajax*.

Akbar, one of the greatest and wisest of the Mogul emperors, was born at Amarkote, in Sindh, in 1542. When he ascended the throne in 1556 only a small part of what had formerly belonged to the Mogul empire owned his authority, and he devoted himself with wonderful success to the recovery of the revolted provinces. He tried by every means to encourage commerce. He had the land carefully measured, so that the taxes should be fair. His people were of different races and religions, but he was just and tolerant to all. He founded schools and was friendly to scholars. Such measures won for him the title of "Guardian of Mankind," and caused him to be raised as a model to Indian princes of later times. He died in 1605.

Akene (*ā-kēn'*). A seed-like fruit, as in the sunflower, dandelion, etc. Often written "achene." See FRUIT.

Akenside (*ā'ken-sīd*), **Mark**, an English physician and poet was born in 1721. He chiefly owes his position among the poets to his *Pleasures of the Imagination*, a poem which at once became famous. He died in 1770.

Akron (*ăk'rŭn*), a city, the seat of Summit County, Ohio, and an important manufacturing, shipping and railroad center. It is situated thirty-five miles south of Cleveland on the Little Cuyahoga River. It is served by the Pennsylvania; Erie; Baltimore and Ohio, and other railroads. Akron is noted for its potteries, farm implements, match factories, and cereal mills. It is the rubber manufacturing center of the world. About sixty per cent of the tire and tube manufactures of the United States are produced in Akron. Clay products, machinery, and aircraft are also manufactured in the city.

The Akron Municipal University, formerly Buchtell College, is situated here. In 1932 it maintained a faculty of seventy-eight instructors and had an enrollment of 1,374 students. Akron also has an excellent public school system, a public library, and efficient police and fire protection. The city was first settled in 1825. It was incorporated as a city in 1836. In 1930 the population was 255,040.

Alabama (*ăl-ȧ-băm'ȧ*), a Gulf State situated in the heart of the cotton belt. It is frequently termed the "Cotton State." Alabama is bounded on the north by Tennessee, on the east by Georgia, on the south by The Gulf of Mexico and Florida, and on the west by Mississippi. It covers an area of 51,998 square miles, 719 square miles of which are water.

Surface. The northern end of the state is crossed by the Tennessee River which in the west flows through a fertile terraced valley, but in the eastern section is flanked by low mountain ranges. The Allegheny range enters in the northeast, trends southwest and terminates in foothills and sand mountains toward the center of the state. There are found the rich iron and coal beds for which Alabama is famous. On the east there is a Piedmont region of rolling upland, while the southern part of the state, comprising three-fifths of its area, is a broad coastal plain.

The chief rivers flowing through the state are the Mobile, Alabama, Tombigbee and the Tennessee. All of these rivers and their tributaries, with the exception of the Tennessee River, flow directly into the Gulf of Mexico. The Alabama and Tombigbee rivers, and their tributaries, are especially valuable for inland navigation. The Tennessee River is navigable to Chattanooga. Small craft can proceed as far as Knoxville. The United States Government began the construction of the nitrate fixation and power plants of Muscle Shoals on the Tennessee River during the World War. Four units of 30,000 horsepower each were put into operation in 1925. The ultimate capacity of the plants is 612,000 horsepower. The work is now being completed by the Tennessee Valley Authority.

Climate. Alabama has a very healthful climate with the exception of the lowlands along the rivers which are especially conducive to malaria. The northeastern section of the state has a delightful climate because of its altitude. The Piedmont Region is healthful, and in the country near the coast the heat is tempered by the Gulf winds. The temperature varies with the season and altitude, but extremes of temperature are rare.

Minerals. The state is enormously rich in minerals. Immense deposits of iron, coal and limestone in close proximity afford conditions for the manufacture of iron products at a low cost which has resulted in a great development of this and kindred industries within recent years. In 1932 there were 1,374,543 gross tons of iron ore produced, 733,774 tons of pig iron, and 7,850,000 tons of coal. There is an abundance of limestone and dolomite. Other minerals include immense beds of rock and phosphates, soapstone, lithographite, slate, gold, silver, copper, tin and marble of the finest grade. The mineral resources of Alabama have been developed with astounding rapidity in the last quarter of a century. The greatest progress has been made in the northern part of the state which is known as the "Birmingham district."

Production and Industry. Alabama is primarily an agricultural state. In 1930 there were 17,555,635 acres of farm land in the state. About one-fifteenth of the cotton supply in the United States is grown in Alabama. In 1932 there were 3,159,000 acres of cotton which yielded 930,000 bales. Other important crops are maize, oats, potatoes, sweet potatoes, peanuts and sugarcane.

The iron industry is of great importance and has had a marvelous growth. This has facilitated and given impetus to the establishment of other industries so that the manufactures of the state have developed with tremendous rapidity. This is particularly true of the open hearth steel and related industries, and the manufacture of cotton goods. In 1932 there were 1,736,344 active spindles in the state consuming 532,230 bales of cotton.

Transportation. The state is traversed by 5,591 miles of railway, 335 miles of which are electric railway. In 1930 Alabama had 3,292 miles of surfaced road which are under a State system of control. The rivers of the state furnish about 1,500 miles of navigable waters, the main streams, the Alabama and the Tombigbee, connecting with the port of Mobile through the Mobile River.

Government. The State legislature consists of a Senate of thirty-five members and a House of Representatives of 106 members. Members of both Houses are elected for four years. Alabama is divided into sixty-seven counties. It is represented in the National Congress by two Senators and nine Representatives. The capital of the state is Montgomery.

Education. There has been a marked decrease in illiteracy in Alabama in recent years. In 1930 there were only 251,095 illiterates in the state over ten years of age. 188,673 of this group were Negroes. In year of 1930-31 the state expended $25,625,814 on education. Since 1920 negro illiteracy had been reduced from 31.3 per cent to 26.2 per cent. In 1931 there were 630,388 pupils enrolled in the public elementary and high schools in the state. One of the most prominent institutions in the state which has done so much for the illiterate Negro is Tuskegee Normal and Industrial Institute, a coeducational school and the largest school for Negroes in the world. It was founded in 1880 by Dr. Booker T. Washington. Other institutions of higher learning are the University of Alabama at Tuscaloosa; Birmingham Southern College (M.E.) at Birmingham; St. Bernard College (Catholic) at Cullman; The Polytechnic Institute and the Agricultural and Mechanical College at Auburn.

History. The first settlement was made at Mobile Bay, in 1702, by a Frenchman, Sieur de Bienville. He was called the "Father of Alabama," although De Soto, the Spanish cavalier, was the first to cross the state with his knights, priests and crossbowmen in 1540. In 1813 occurred the war against Tecumseh and the Creeks. This region was organized as a Territory in 1817. It was admitted to the Union on December 14, 1819. In January, 1861, the state seceded and furnished the Confederate army with sixty-nine regiments of infantry, twelve of cavalry, and twenty-seven batteries.

According to the census report of 1930, Alabama had a population of 2,646,248, an increase of 12.7 per cent over the census report of 1920. The most important cities are Birmingham (359,678); Mobile (68,202); and Montgomery, the capital, (66,079).

See BIRMINGHAM; MOBILE; MONTGOMERY; TUSKEGEE.

Alabama Claims, The, demands for compensation made by the United States upon Great Britain in 1862. The *Alabama* was a cruiser built in a British port for the use of the Confederacy in destroying the commerce of the northern states during the Civil War. Against the protests of Charles Francis Adams, the American minister to Great Britain, the *Alabama* was permitted to sail from the latter country in 1862. For three years, much harm was done to the shipping of the United States. The *Alabama* was at last defeated and sunk off the northern shore of France (June 19, 1864) by the *Kearsarge*, under the command of Captain Winslow. The United States presented its claims for damages to Great Britain. In 1871 it was decided by a treaty between the two countries to submit all claims for damages effected by the *Alabama* and other vessels to a tribunal of five persons, who were to be named by the President of the United States, the Queen of England, the King of Italy, the President of the Swiss Confederation and the Emperor of Brazil. In 1872 this court awarded $15,500,000 to the United States. Because the tribunal met in Geneva, Switzerland, its verdict is often called the *Geneva Award*.

Alabaster (*ăl′ă-băs-tĕr*). See Gypsum.

Aladdin (*ȧ-lăd′ĭn*), a hero of one of the stories of the *Arabian Nights' Entertainments*. He possessed a wonderful lamp and an equally wonderful ring, on rubbing which two frightful genii appeared, who were, respectively, the slave of the ring and of the lamp, and who obeyed the bidding of any one who might have them in his keeping.

Aladdin had been a poor boy in China, before he secured his marvelous lamp and ring. Through their use he gained great wealth. He secured a princess for his bride, and in a single night was given a magnificent palace. Eventually he became sultan. Unfortunately, the lamp was once lost during the absence of Aladdin, through a trick performed by the African magician who had owned it in the first place. He disguised himself and went about crying "New lamps for old," thus securing the magic lamp. By rubbing it, he transported the entire establishment to Africa. Aladdin, however, still possessed the ring, and the genii of the ring made it possible for him to follow the magician and find where the palace had been taken. The magician was killed, the lamp secured, and Aladdin took his home and his princess back to China and great prosperity and success. The expression of "Aladdin's lamp" from this story of its wonder-working powers, has become almost proverbial.

Alameda (*ă-lȧ-mā′dȧ*), an important city of Alameda County, California, opposite San Francisco, on the shore of the Bay of San Francisco, and contiguous to the city of Oakland. It is reached by the Southern Pacific, Central Pacific and Santa Fe railroad systems. It is connected with San Francisco by ferry from the moles and wharfs of the town. The town makes a delightful suburb of the latter city, surrounded by shady oaks, and with clean streets, good schools and churches and the quiet and freedom of suburban life. In 1930 the population was 35,033.

Alamo (*ä′lä-mō*), **The,** a fort near San Antonio, Texas. Here 188 Texans bravely resisted 2,500 Mexicans from February 11 to March 5, 1836, and nearly all perished rather than surrender. When the fort was taken by the Mexicans, who lost 1,600 men, only five Texans were alive. These were ordered to be shot. Here were killed David Crockett and Col. James Bowie, after whom the bowie knife was named. Because of this heroic defense Alamo is called the "Thermopylæ of America." "Remember the Alamo!" became the cry of the Texans in their struggle for independence. See Texas.

Alaric, whose name means "all ruler" was a chief and king of the Visigoths. We first find him in 394 A.D., as a commander in the army of the conquered Goths, under the Roman Emperor Theodosius. When Theodosius died, the Goths rebelled, attacked Athens and plundered it of its treasurers. A Roman army was then sent against him, under General Stilicho, which drove him to a stronghold in Elis and besieged him there. He escaped with his army and the new emperor, Arcadius, appointed him prefect or governor of the Roman province of Illyricum. This kept Alaric quiet for five years. About 400 A.D., however, he set out to invade the empire of the west. It took him two years to reach Milan, where the Emperor Honorius was dwelling. He drove him to a fortress and besieged it, but was defeated here, and afterward at Verona, by Stilicho. Still it was thought safest to give Alaric his old place as prefect of Illyricum and a large amount of gold. When the emperor foolishly killed Stilicho, his best general, Alaric marched at once on Rome and laid siege to it. When the people attempted to buy him off, his price was so exorbitant that they said they could not pay it. Alaric's well-known reply was, "The closer hay is pressed, the easier it is mown." He was at last bought off with a great treasure of gold and silver. Honorius, however, broke the treaty, and a second time Alaric attacked Rome. This time the people opened the gates and asked him to name a new emperor. When Honorius became emperor again, he sent, treacherously, a savage chief to attack the camp of the Goths. Alaric marched again on Rome and pillaged it for six days, and then overran all Italy with his troops. He died in 410.

Alaska, a territory of the United States situated in the extreme northwestern part of the North American continent. It is bounded on the north by the Arctic Ocean, on the west by the Arctic and Bering Sea, on the south by the North Pacific Ocean, and on the east by Canada. It extends over an area of 586,400 square miles. Much of the coast line is very irregular, deeply indented and abounding in islands. Chief among these islands are the Aleutian, Prince of Wales, Chichagoff, Kadiak, Baranoff, Admiralty, Unimak, St. Lawrence, Kupreanof and the Pribyloff Islands.

Surface. The coastline is followed by mountain ranges, which are a continuation of the Rocky Mountains, and spread apart in this peninsula. The main range bends westward along the coast to the end of the Alaskan peninsula. The other takes a north-west direction at Prince William Sound and a second turn gives it a southwest-northeast direction. This range is known as the Alaskan Range. This is the loftiest elevation in North America. Its famous peaks are Mt. McKinley (20,300 feet); Mt. Logan (19,850 feet); Mt. St. Elias (18,008 feet), and Mt. Wrangell (14,005 feet).

Moving down through the valleys of this chain of mountains are the great ice rivers known as glaciers. Many of these reach to the sea, and one of them, Muir Glacier, not far from Sitka, is especially beautiful.

Alaska's interior, west of the Porcupine Hills, is a vast swamp moor which stretches to interminable wastes of tundra that reach to the Arctic Ocean.

Climate. The entire coastal section and the insular districts are influenced by the Japanese current and the mountains. The latter are a protection against the Arctic winds, while the former fills the air with warm vapors. Condensation takes place when these come in contact with the mountains and cause almost perpetual fog and rain. For these reasons the temperature is less extreme than in the districts east of the Rockies. In the mountains where the warm currents and vapors are absent, Arctic weather prevails, long intense winters and short warm summers..

Drainage. The most important river in Alaska is the Yukon, 2,300 miles long, which may be traveled from end to end four months out of the year without seeing snow. Other important rivers are the Stickeen, Copper, Suchitna, Muchagak and the Kuskowim, and the tributaries of the Yukon, the Porcupine and the Tanana. The Sushitna is navigable for 110 miles and the Yeutna for 100 miles.

Forests. There are two National Forests in the Territory, the Chugach and the Tongass, which extend over 21,345 acres. It is estimated that these forests contain 84,760,000,000 board feet of timber. Seventy-four per cent of this timber is western hemlock and twenty per cent of it is Sitka spruce. The latter wood is in universal use and grows in a stunted form even up to the Arctic Circle. Other valuable woods are the white pine cedar, the yellow cedar and the balsam fur which is used in tanning.

Minerals. In 1931, $9,633,200 in gold was produced (466,006 ounces). In South-East Alaska a low grade of ore is found. Gold is also produced in the interior along the Yukon River, at Nome, and along the west coast. The first important discovery of gold in Alaska was made in 1896 near Klondike, although gold had been discovered at Juneau in 1880.

Alaska is also noted for its silver and copper output. In 1931 the silver output was valued at $115,405 (397,944 ounces). In that same year 23,233,034 pounds of copper were produced. There are valuable tin ore deposits near Cape Prince of Wales. Extensive coal deposits lie along Cook inlet, the Yukon near Fairbanks and in the northern and southern portion of Alaska. In 1931 there were 105,900 tons of coal produced from three mines. Other mineral deposits are marble and petroleum. An excellent grade of oil has been found in Katalla field on Controller Bay.

Productions and Industry. The principal industries of Alaska are salmon fisheries and mining. In 1930 there were 29,283 persons employed in Alaska's fisheries. In 1931 salmon exports to the United States totalled $25,455,466. The salmon production for 1932 was valued at $21,715,918. The fisheries of Alaska are among the richest in the world. More than half of the salmon product of the United States comes from Alaska. Cod, mackerel, halibut and herring are also found in Alaskan waters.

The agricultural resources of Alaska are almost illimitable, but agriculture has not proved practicable thus far. Vegetables can be grown in nearly every part of the Territory. There is sufficient pasturage for 30,000,000 reindeer which would market 900,000,000 pounds of meat annually. In 1930 there were 500 farms throughout Alaska with a total area of 525,942 acres. The Federal Government has established four agricultural experiment stations at Sitka (nursery); Kadiak (dairying); Rampart (grain); and Fairbanks (farm demonstration).

The Pribyloff Islands are the seat of the fur seal industry in Alaska. The herd is Government-owned and is administered by the Department of Commerce. Eighty-five per cent of the fur seals of the world come from the Pribyloff Islands. In 1931 the herd consisted of 1,045,101 animals. There were 49,984 skins shipped to the United States in that year. The number of seals to be killed each year is fixed by regulation of the Federal Government. The proceeds from the sale of the seal skins is divided between the United States, Japan and Great Britain. There are 275 blue fox ranches stocked with 36,000 blue foxes. These ranches represent an investment of $6,850,000. Foxes, mink, and marten are also raised by fur farmers.

Education. The Bureau of Education of the Federal Government controls the educational policies of Alaska. In 1931 there were eighty-eight territorial white schools and fifteen four-year high schools. There are ninety-eight native schools in operation and three industrial schools. Illiteracy in the Territory has been reduced from 24.8 per cent to 20.1 per cent since 1920. There is but one institution of higher learning in Alaska, that of the Alaska Agricultural College and School of Mines.

Population. According to the census of 1930 Alaska had a population of 59,278. Of this total 28,640 were white, 29,983 were Indians, twenty-six were Chinese, 278 were Japanese and 136 were Negroes.

Juneau, situated near Douglas Island, is the seat of Government. In 1930 the population was 4,043. Other important cities are Ketchikan (3,796); Anchorage (2,277); Fairbanks (2,101); Nome (1,213); and Sitka (1,056).

Government. Alaska became a Territory of the United States Government by an Act of Congress approved August 24, 1912. Its legislative Assembly consists of eight senators who are elected for four years, and sixteen representatives, elected for two years. The Territory is governed conjointly by this legislative assembly and the National Congress at Washington. The Governor is appointed by the President of the United States.

In 1929 Congress authorized the appointment of three ex-officio Commissioners to whom large powers have been delegated. Alaska sends one Delegate to the National Congress.

History. The peninsula and strait were discovered in 1728 by Vitus Bering, a Danish navigator in Russian service. The first settlement was made in 1748 on Kadiak Island at Three Saints. In 1799 an important settlement was made at Sitka. On March 30, 1867, a treaty was concluded between Russia and the

United States whereby the United States purchased Alaska for $7,200,000. No organization was effected, however, until 1884 when Alaska became a District and was governed by the laws of the State of Oregon. That status was maintained until 1912 when Alaska became a Territory.

Boundary Dispute. The United States and Russia claimed joint ownership of the Bering Sea as an island body of water to protect their seal fisheries. This Great Britain would not allow for she had Canadian sealing interests to protect. At length in 1902 a protective agreement was entered into between the two nations.

There was also an old contention as to the United States and Canadian boundaries which was never urged because the districts in debate were regarded as worthless. The discovery of gold in 1896-97 revived the question and forced a settlement. On September 3, 1903, the Alaskan Boundary Commission met in London, and on October 20, 1903, the official report was signed by the British and the American commissioners, the Canadians refusing. The majority ruled, however, and the report was substantially in favor of the United States. By the decision the gold fields are part in Canada and part in the United States, but the Pacific coast-line is wholly within the control of the United States.

See JUNEAU; KLONDIKE; NOME.

Albania (*ăl-bā'nĭ-ä*), a mountainous country situated between southern Yugoslavia and Greece, which formerly comprised the Turkish provinces of Scutari and Yanona. The territory is noted for its underground rivers and beautiful lakes. The majority of Albanians are mountaineers.

At the conclusion of the Balkan Wars, the autonomous kingdom of Albania was established at a conference which convened in London on May 30, 1913. Until the opening of the World War in 1914 it was governed by a king and an international commission. In 1914, however, King William I was forced to flee from the capital, Durazzo. A republican form of government was established at Tirana, the present capital city. From 1924 to September 1, 1928, Ahmed Zozu was president of that government. In the latter year the Assembly proclaimed him King Zog I of the monarchy of Albania.

See BALKANS, THE.

Albano (*äl-bä'nō*), a lake, mountain and town in Italy, situated about fifteen miles southeast of Rome. The town (known as the Roman Albanum) is built on the slope of the Alban mountains, on the site of Pompey's villa. It is noted for the beauty of its surrounding scenery and for the interest it possesses for the classicist and antiquarian. The population is 8,826.

Albany (*ôl'bȧ-nĭ*), the capital of the state of New York, is situated on the west bank of the Hudson River, 142 miles above New York City. Albany has a river frontage of a little over four miles, and extends westward for about nine miles. The city rises steeply from the narrow alluvial strip along the river, often flooded, to a sandy tableland which has four different elevations with their corresponding valleys. Transportation facilities are excellent. Two railroad and foot bridges and one wagon bridge cross the river, and Albany is served by the Boston and Albany branch of the New York Central; the Boston and Maine, and the Rutland railways. For many years, this city was the starting point of all the extensive travel and traffic from east to west over the Erie Canal, and is at present the terminus of the state Barge Canal system. It is, therefore, an important port, situated as it is at the intersection of the great western and northern rail and water routes. The Hudson River connects it with the city of New York and the Atlantic Ocean. Albany is the head of navigation for large steamers, and by means of the Champlain-Barge Canal system has access to western Vermont, the St. Lawrence River, Montreal and the very center of Canada. It is, therefore, in addition to its political importance as capital, of great importance commercially.

It was settled by the Dutch in 1614, the first settlement, after Jamestown, within the thirteen colonies. In 1624 a Fort Orange was built, and the village which grew up around it was named Beaverwyck. This was changed in 1646 to Willemstedt. When captured by the British in 1664, the name was changed to Albany. The city was chartered in 1686. It is an important distributing point for trade from the west. It has a large trade in fruit, lumber, grain and wool, and extensive manufacturers of iron and brass, stoves, shoes, paper products, plate glass, auto accessories, and motor buses. There are also manufacturers of such varied products as electric car heaters, blocks, checkers, dominoes, college caps and gowns, carbonic acid gas, clay products, cigars and tobacco, and absorbent cotton. Albany has the largest printing establishment in the eastern United States. In 1929, 223 manufacturers employed 9,609 wage-earners, who produced goods to the amount of $52,178,000. Albany is the seat of both Roman Catholic and Protestant bishoprics. There are seventy-four churches in the city. It has many fine public buildings. The most notable edifice is the State Capitol, a magnificent structure, built of granite, at a cost of over $24,000,000. It is the seat of the State Normal College, Albany Institute, the medical and law schools of Union College at Schenectady and other educational institutions. Fine residences and public buildings, a beautiful park, modern filtration plant, and excellent drainage combine to make it an attractive as well as a healthful city. In 1930 the population was 127,412.

Albany Congress, a convention of representatives of the colonies of Massachusetts, New Hampshire, Connecticut, Rhode Island, New York, Pennsylvania and Maryland which met at Albany on June 19, 1754. The congress was summoned by the British government to consider defensive measures in view of the threatened war with France. At this congress Benjamin Franklin proposed a confederation of the colonies under a president to be appointed by the Crown, with a council to consist of representatives chosen by the different colonies. The president, who was to be commander in chief, was to appoint all military officers, and commission civil officers who should be nominated by the council, and to have veto power over the council. The council was to have power to assess taxes, maintain an army, build defenses and legislate concerning matters of common interest, such as relations to Indians, etc. The plan was not adopted, and the congress was of consequence only as presenting an idea which later on was realized in the union of the colonies.

Albatross, a long-winged ocean bird, occurring in tropical and southern seas. It almost never goes ashore, save in the breeding season, then seeks a lonely cliff or rocky slope. The single egg is usually hatched in the bare earth. The albatross is famous in literature, as in Coleridge's *Ancient Mariner*, and also in accounts of voyages. The birds follow vessels for many days, being almost continuously on the wing, though, in calm weather, they are sometimes seen resting on the surface of the water. Many naturalists believe that their powers of flight have been overestimated, and that most of the birds sleep on the water at night and join the ship again after an interval of rest. A few birds may be seen flying astern at night, but a less number than in the daytime. They feed on refuse that is thrown overboard, not diving for their food but eating what they find on the surface of the water. Their cry is between that of a raven and a sheep. The wandering albatross or Cape Sheep is the largest of water-birds in existence, sometimes measuring fourteen feet in expanse of the wings. Its general color is white, with wavy lines of black, and its hind feathers are black. The bill is pinkish white and the legs a light flesh color. The coat of feathers is very heavy, serving as protection against water and long continued cold. Their flight is a beautiful sailing motion.

Albemarle. See Monk.

Albemarle Sound, a deep, shallow inlet of the Atlantic, on the northeast coast of North Carolina, connected southward with Pamlico Sound. It extends from the mouth of the Roanoke River for about sixty miles eastward, where it is separated from the Atlantic by a long, narrow spur of land. It is from 5 to 15 miles in width, and being enclosed from the ocean its waters are mainly fresh, while it is almost useless for shipping. Its average depth is only twenty feet. The Sound and neighboring region received its name in early colonial days when Charles II of England, in 1663, made a favorite general of his, the first Duke of Albemarle, one of the Lords Proprietors of the Carolinas.

Albert I, king of Belgium, was born at Brussels on April 8, 1875, the younger son of Prince Philippe of Saxe-Coburg and Gotha (the Count of Flanders) and the Princess Marie of Hohenzollern-Sigmaringen. The greatness and depth of character of this beloved monarch have been eulogized in the tribute which was uttered in his memory, "with the sole exception of his own grandfather, Leopold I, he was the best Constitutional Monarch who has ever reigned on the Continent of Europe."

During his student days Albert entered a military academy. He showed a marked taste for engineering and mechanics. Naval and aërial construction especially attracted him and even after his accession to the throne he went to England to make a special study of naval construction. He was known throughout Belgium and the world at large for his personal charm and democratic nature. Having made a broad study of politics and economics during his extensive travels, he early conceived the idea of working for a more general prosperity for his people even before he ascended the throne. He mingled freely with the laboring masses, working in the mines, driving railway engines and performing other manual labor which brought him into actual contact with the working classes. His genuine interest in the welfare of his people endeared him to the hearts of all Belgian subjects.

In 1898 he visited the United States where he was especially interested in American railways. In 1900 his travels carried him to the Belgian Congo. Here he made a personal investigation of the human slavery problem which had been a blot on Belgian civilization for many years.

On October 2, 1900, he married Princess Elizabeth, second daughter of the Duke of Bavaria (Charles Theodore). Three children were born of this union before Albert ascended the throne. They are Leopold III, the present reigning monarch of Belgium, born on November 3, 1901; Prince Charles, the Count of Flanders, October 10, 1903, and Princess Marie José, Crown Princess of Italy, August 4, 1906.

Two deaths intervened to make Albert next in line of succession to the throne of Belgium, those of Prince Leopold, the only son of Leopold II, who died on June 22, 1869, and of Prince Baudoin, elder brother of Albert, who died on June 23, 1891. Succession to the Belgian throne is automatic. The country is a constitutional and hereditary monarchy. The Salic law excluded the daughters of Leopold II from the throne, and on December 17, 1909, upon the death of the king, a new monarch ascended the throne in the magnetic person of Albert I.

Albert came to the throne at a time when the prestige of the monarchy had suffered greatly from the tactics of Leopold II, who lacked scruple and concentration. The powerful influence of the new ruler was soon apparent. He promised his subjects a reign of progress. One of his first tasks was to effect

Albert I of Belgium

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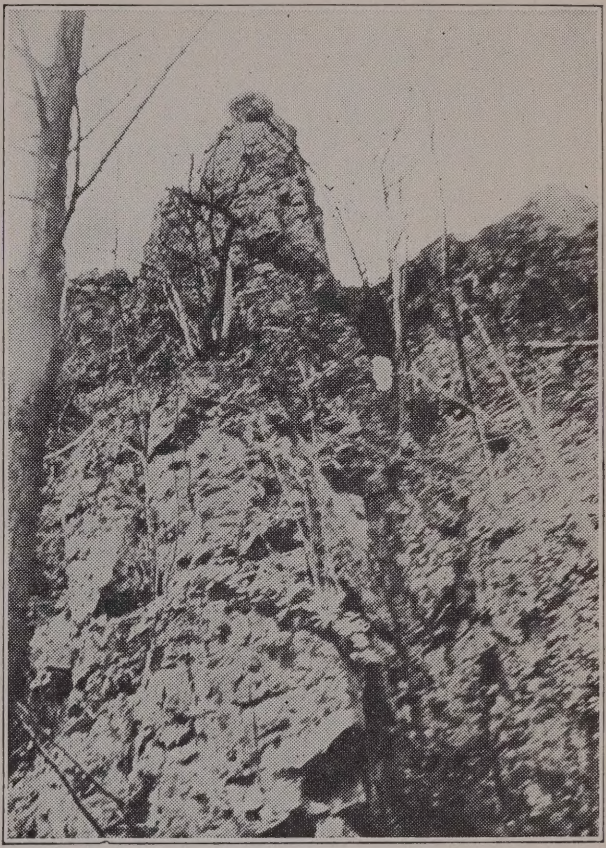
some solution to the Belgian Congo problem, a task which he was well fitted for in view of his personal investigation of the problem a few years earlier. It was also during the early part of his reign that he effected several social, economic and legal reforms. The democratic spirit which Albert had displayed when he was the Crown Prince of Belgium was still witnessed in his every act after he became king. Pomp and circumstance were tolerated by King Albert only to the extent that events made them necessary. Simplicity ruled in all things. The new king was friendly and modest to all. He became known as a keen diplomat and a beloved ruler the world over.

The threat of war in Europe was clearly recognized by Albert and he realized the necessity of preparedness in Belgium itself. When the note of war was sounded in 1914, King Albert proved himself as great a statesman in war as he had been in peace. He endured the hardships of the soldiers in the field and in several battles he faced the same dangers to which they were exposed. He fought on the battlefields of Flanders and northern France during the turbulent days, a true hero and friend to his comrades. Although Belgium was faced with defeat, the country was not submitted to disintegration. King George of England so fittingly said of Albert, upon hearing of his death, "The British Empire can never forget the heroic figure whose courage was an inspiration to the 'allies' throughout the dark days of the war."

At the close of the World War, conditions in Belgium seemed positively ripe for social dissolution. Its factories had been destroyed, its lands laid waste and desolate. The Belgian people were helpless, standing by with shattered nerves and shattered hopes. Their problems were eased and their kingdom restored by the ingenuity of their faithful and ideal king, Albert I. After the signing of the armistice, Albert devoted all his energies towards resuscitating his war-torn land and to the work which had always been his chief concern, the betterment of the common people. He organized a new government to cope with the period of reconstruction which must naturally follow a period of war, and made a stirring plea to all political parties and people to co-operate in the task which faced them. Albert personally visited the devastated areas and contributed vast sums for the relief of sufferers of the war.

In 1919 King Albert, Queen Elizabeth and Prince Leopold journeyed to the United States, England, France, Spain, Brazil, and other countries for the purpose of studying trade conditions, hoping to find new markets for the commerce of Belgium.

Albert I was a great sportsman and a devotee of mountain climbing. He became world famous for his mountain climbing exploits. In 1932 he scaled a 9,400 foot peak in the Alps and ascended the summit of Brenta, 11,000 feet. It was in the pursuit of this sport that the beloved monarch so tragically met his death. On February 17, 1934, Albert set out for Namur, a city about fifty miles distant from Brussels, to engage in his favorite sport. It was while ascending Rocher de Marches des Dames, a peak situated about ten miles from Namur, that the king slipped and fell to his death 100 feet below.



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MARCHES LES DAMES
The crumbling crag of sandstone on the River Meuse, Belgium, from where King Albert fell to his death.

Albert's death, which was a deep loss to Belgium, was an international sorrow. His subjects revered and loved him, and the world honored him. He was a great soldier, a capable statesman, an ardent student and traveller, a fine sportsman, a cultured scholar, and a democratic monarch, Albert was succeeded by his son, Leopold III, who was crowned King of Belgium on February 23, 1934.

See BELGIUM; LEOPOLD III; WORLD WAR.

Albert, Prince Consort, Prince of Saxe-Coburg-Gotha, and husband of the late Queen Victoria of England, was born at Schloss Rosenau, near Coburg, on August 26, 1819. His first marriage was consummated with Louisa, daughter of the Duke of Saxe-Gotha-Altenburg. In 1840 he married his cousin, Queen Victoria of Great Britain and Ireland. Nine children were born of this marriage. The title of Royal Highness was bestowed upon him at the time of his marriage and he became a naturalized subject of Great Britain. A short time later he was made field-marshal in the

British Army. In 1842 the title of Consort of Her most Gracious Majesty was conferred upon Prince Albert. In 1857 he received the title of Prince Consort. He acquired great influence in public affairs as the prudent and trusted adviser of the Queen. As a patron of science and art he became popular throughout the whole of England. He expended both time and money in public undertakings and in the support of learned associations.

Prince Albert died of typhoid fever on December 14, 1861, at Windsor Castle. He was interred in the royal mausoleum at Frogmore near Windsor. Many tributes have been raised in his memory. The Albert Memorial in Kensington Gardens is a majestic Gothic canopy which bears the inscription, "Queen Victoria and her People to the Memory of Albert, Prince Consort, as a tribute of their gratitude for a life devoted to the public good." The Albert Embankment, an artificial stone wall along the Thames, was erected in his memory at a cost of $5,000,000 (£1,000,000). In 1871 Albert Hall, with a seating capacity of 8,000, was erected in London. Albert Nyanza, a large lake in east Central Africa was named in honor of Prince Albert.

See SAXE-COBURG-GOTHA; VICTORIA.

Alberta, a western province of the Dominion of Canada. It was created in 1905 by the Alberta Act which was passed by the Canadian Parliament in that year. Like Saskatchewan, this province was carved out of the Northwest Territories of which it formed a large portion. It has an area of 255,285 square miles, 2,360 square miles of which are water. It lies north of the international boundary line and immediately east of the Rocky Mountains, bounded on the east by Saskatchewan, on the west by British Columbia, on the north by the Northwest Territories, and on the south by the United States. Alberta is situated between the forty-ninth and sixtieth parallels of latitude and the 110th and 120th meridians. No other political division of the Dominion possesses greater or more varied natural resources.

Climate. The province has a mild climate in winter and enjoys cool breezes in summer. Its location gives it the benefit in winter of the Chinook winds which follow an easterly direction from the currents in the Pacific Ocean, whence they receive their warmth. The snow in winter rarely lies longer than four or five days at a time when it is melted by the wind, thus making the winters mild and filling the creeks and ponds with water for the stock on the ranches. In the summer these creeks are constantly supplied with water from the melting snow in the mountains. In both seasons, therefore, there is always to be found throughout the district an abundance of water for grazing and all other purposes.

Agriculture. Alberta is chiefly an agricultural province. It contains 60,000,000 acres of arable land. Of this immense tract, however, scarcely one-fourth of the area has been brought under cultivation. No waste country is to be found in the province. Her greatest wealth, however, will always be in agriculture. The northern part of this province is in the same degree of latitude as Scotland, and the southern part of the province the same as a part of Germany. North Alberta is watered by portions of two great river systems, the Peace River and the Athabasca River. The soil of from one to three feet of black vegetable mould with but little sand or gravel is of almost inexhaustible fertility.

As in other Canadian provinces grain is the most important crop of Alberta. Rye, flax seed, hay and clover, and fodder corn are grown extensively. Winter wheat is successively grown in Alberta, more especially in the southern parts and the area under crop is rapidly increasing. The growing of winter wheat has revolutionized conditions. Alberta ranks second only to Saskatchewan in the Dominion's production of wheat. Approximately 7,999,895 acres are devoted to the growing of wheat alone in this province. More than 3,000,000 acres are sown in oats and barley.

Mining. According to an estimate made by the Geological Survey of Canada the coal area of Alberta is placed at 16,588 square miles. Beneath the soil in this area are 1,035,629 million tons of coal, 80,000 million tons of which are lignite. In 1931 there were 4,564,290 tons of coal mined in Alberta. The province also has an abundant supply of natural gas. In 1931 there were 18,327,139 cubic feet of this gas consumed. Medicine Hat, one of its largest towns, is famous for its natural gas wells. In the region known as Turner Valley an excellent grade of gasoline is extracted from the natural gas. In the McMurray district of northern Alberta are found huge deposits of bituminous sand which contain from fifteen to eighteen per cent bitumen. Crude petroleum is found in large quantities underlying the coal fields. In 1931 there were 1,455,195 barrels of oil produced. Other important minerals include manganese, gypsum, excellent building stone, and potash. On October 1, 1930, all natural resources were released from Dominion control and placed under Provincial control.

Industry. The cool temperature during the summer months, with the grasses and pure cool mountain streams, makes Alberta one of the best countries to be found for cheese and buttermaking. This province is rapidly becoming as noted for such industries as for its ranches. Live stock and dairying are the most important industries of the province. Holsteins are the most common dairy cattle, while Shorthorns, Herefords and Angus are bred as beef cattle. In 1931 Alberta had 381,200 milch cows and 1,136,616 other cattle. There were 789,298 sheep in the province. In this same year there was 3,500,000 pounds of wool clipped.

The lakes of Alberta are filled with an abundance of fish, whitefish, pickerel, pike, and trout, but to date the fishing industry has not been developed to any very great extent.

The most important manufacturers of Alberta are flour, oatmeal, cement, clay, brass and iron, glass, and wood products, biscuits and macaroni, and clothing. There are large linseed oil mills and oil refineries, pork and beef packing houses, railway repair shops and canning factories situated throughout the province.

Education. The public schools of Alberta, schools of all grades being included in this category, are all governed by the same board of trustees. These schools are supported by taxes levied by the local board and by Government grants. Every effort possible is put forth to encourage elementary, secondary, technical education, and agricultural training. In 1931 there were 3,762 schools situated throughout the province. Sixty-four of these institutions were consolidated schools, and sixteen were rural high schools. Institutions of higher learning include Normal schools at Calgary, Ambrose and Edmonton, and the University of Alberta. The latter institution was organized in 1907. It is situated in South Edmonton and in 1933 had 1,736 student enrolled.

Population. In 1931 Alberta had a population of 731,605, an increase being noted of 546,410 since the province first came into existence in 1905. Its capital city is Edmonton which has a population of 79,197. Other important cities are Calgary, 83,761; Lethbridge, 13,489; Medicine Hat, 10,300; Drumheller, 2,987, and Wetaskiwin, 2,125. About sixty per cent of the population of Alberta is rural.

Government. Executive power in the province nominally rests with the Lieutenant-Governor who is appointed by the Dominion Government. Actual executive power, however, is vested in an Executive Council or Cabinet of the Legislature. Legislative power is vested in the Legislative Assembly, in the name of the King, the members of which are elected by direct vote of the people. Woman suffrage has existed in Alberta since 1916.

The seven most important cities of Alberta operate under special charters which have been granted by the Northwest Territorial Assembly and confirmed by the Legislative Assembly of Alberta. Governing bodies of these cities are composed of a Mayor and a council of from six to ten members.

All judicial power of the province rests in the Supreme Court which is comprised of two divisions, the appellate and trial divisions. Judges of this court receive their appointments from the Dominion Government and, unless impeached by the Dominion Parliament, hold office for life. Courts of Civil and Criminal Jurisdiction, district courts and Juvenile Courts are listed as minor courts. The latter courts are entrusted with the trials of boys under sixteen years of age, and of girls under eighteen years.

See CANADA; ATHABASCA; BANFF; CALGARY; CHINOOKS; EDMONTON; LETHBRIDGE; LOUISE, LAKE; MEDICINE HAT.

Albert Edward Nyanza (*nyän'zä*), a lake in Equatorial Africa, about 50 miles southwest of Lake Albert and connected with the latter lake by the Semliki River. It is situated between Uganda and the Belgian Congo and was discovered by Stanley in 1876. Its old name was Muta Nzige. ("Nyanza" means "great water".)

Albert Nyanza, a large lake in east Central Africa. Its surface is 2,720 feet above the level of the sea. On its western coast are the Blue Mountains, rising 7,000 feet higher, and on the east steep cliffs rise almost as high. The White Nile, flowing from Lake Victoria, enters Lake Albert and issues from it near its northernmost point. Sir Samuel Baker was the first European who explored it in 1864. It extends over an area of about 2,000 square miles.

Albigenses (*ăl-bĭ-jĕn'sēz*), a French religious sect, so named from the town of Albi, where a council was held in 1176 which condemned their doctrines. They taught the doctrines of the Manichæans that there are two opposing principles, one good and the other evil. They also rejected the Old Testament. The sect practically died out about 1227.

Albino (*ăl-bī'nō*), a person or animal whose skin and hair are perfectly white. The white negroes of West Africa were first called by this name by the Portuguese, but it is now applied to persons of any race who have this peculiarity, though it is most common among dark races. Animals also have the same peculiarity, as the white elephant, white hare and white mice. The whiteness is caused by the absence of coloring matter in the outside layer of the skin. The eyes of albinos are red, and are weak in the daytime but strong at night.

Alboni, Marietta, a celebrated (contralto) Italian opera singer, was born in the Romagna, Italy, in 1823. She studied under Rossini and made her début at Bologna, achieving a phenomenal success. She afterward sang in all the chief Continental and English cities, and also appeared in the United States. She married Count Pepoli, a Bolognese, after whose death, in 1863, she retired from the stage. She died in Paris on June 23, 1894.

Albumen, a substance familiarly known in the white of eggs, which exists abundantly in all animals and in the juices, seeds, grains and other parts of plants. It is one of a class of substances called *proteids*, which form an important part of food, since they build up the tissues of the body. Albumen is naturally a fluid, but when heated to a high temperature it is changed into a firm, white solid. White of egg is used to clear liquids, as coffee, because when boiled it collects all the impurities in flakes and rises to the surface as scum, or sinks to the bottom, according to the weight of the liquid holding it.

Albuquerque (*ăl-bŭ-kûr'kē*), the largest city of New Mexico and the seat of Bernalillo County. It is situated on the Rio Grande, fifty-six miles southwest of Santa Fe. The city stands 4,930 feet above sea level and is surrounded by rich gold, silver, copper and iron mines. It is served by the Atchison, Topeka & Santa Fe, and the Atlantic & Pacific railways. Among the most important industries of the city are the trade in wool and hides, and the manufacturing of lumber, sash, doors, and boxes. Several railroad and machine shops, lumber mills, and brick yards are located here. The vast resources which surround Albuquerque and the enterprise of its people are responsible to a great degree for the extensive development of industry which has occurred and for the rapid increase in the population of the city.

The University of New Mexico is situated in Albuquerque. It was founded in 1892 and today has an enrollment of 1,230 students. The campus buildings are of the old Pueblo style of architecture, unique and picturesque. Thousands of artists and writers visit Albuquerque annually where they find a vast store of material on ancient Spanish and Indian civilizations. The United States Government maintains a school for Indians in this city.

Albuquerque is an old Spanish settlement which was established in 1706. It was named in honor of the viceroy of New Mexico. The newer section of the city was founded in 1880. Twenty years later it had a population of 6,238. Since that year, 1900, Albuquerque has grown rapidly and today 26,750 inhabitants dwell within its confines. The city attracts many thousands of visitors each year because of its sunshine and climate which is especially adapted for the treatment of pulmonary diseases. Several sanatoria have been constructed here so that victims of such diseases might enjoy the health benefits of the region.

Alcamenes (*ăl-kăm'ē nēz*), a famous Athenian sculptor, a pupil of Phidias. He flourished from about 448 to 400 B. C. He is said to have once competed with his master in chiseling a statue of Minerva. Alcamenes's statue was beautiful in finish, but he had forgotten that it was to be placed on a high column; and so placed his work would not bear comparison with that of his great master. His masterpiece was his statue of *Venus Urania,* in the temple of Venus at Athens.

Alcestis (*ăl cĕs'tĭs*), in classic mythology, the daughter of Pelias and wife of Admetus, king of Thessaly. She is said to have sacrificed herself that her husband's life, then in danger, might be spared, as Apollo had promised her. She was brought back from Hades by Hercules. The story of her wifely devotion is the theme of a tragedy, or rather of a melodrama, by Euripides.

Alchemy (*ăl'kē-mĭ*), the art of making gold and silver and of preparing a universal medicine. In ancient times it seems to have been cultivated to some extent by the Greeks and Chinese, and was learned by the Arabs in their invasions. In the middle ages it was looked upon as a science, and was earnestly studied among the nations of Europe. A university of alchemy was founded at Prague, and princes for a time kept their private alchemists.

The alchemists believed in the existence of a certain solid red preparation called the philosopher's stone or the grand elixir, which, when placed on common metals, such as lead, and melted to a liquid, would change them into gold. It would also cure all diseases, while a similar white preparation changed all metals to silver. In the study of this art many scientific truths were discovered, and so alchemy became the forerunner of chemistry.

See CHEMISTRY.

Alcibiades (*ăl-sĭ-bī'ȧ-dēz*), one of the most brilliant of the Athenians. He was born at Athens about 450 B. C., and boasted that he was descended from the hero Ajax, and through him from Jupiter himself. He was brought up by Pericles, his guardian, and was a favorite pupil of Socrates. He was beautiful in person, had splendid abilities and energies and great ambition, but was without self-restraint and utterly selfish. Entering public life at the time of the contest with Sparta he became the leader of the war party, and persuaded the Athenians to undertake an expedition against Sicily. The night before he set out as one of the generals all the images of the god Hermes or Mercury were thrown down, and he was charged with a share in the sacrilege. No sooner had he reached Sicily than he was recalled to stand trial, but fled to Sparta and devoted all his energies to defeating his own countrymen. Soon the Spartans grew jealous of his power and influence and he was compelled to flee to the Persians. Anxious to return to his native Athens, he promised the Athenians the help of the Persians. He was recalled and made general, and won several brilliant victories, but was banished again at his first defeat. After the fall of Athens, on his way to the Persian court to seek help for his country, he was assassinated, 404 B. C.

Alcides, a patronymic given to Hercules by Alcæus, the father of his mother's husband, Zeus (Jupiter).

See HERCULES.

Alcimede, the daughter of Phylacus and Clymene, and the wife of Acson. She was the mother of Jason. As told by Pherecydes, Zeus charged Hermes to take Alcimede to the Islands of the Blest. Here she became the wife of Rhadamanthys after he had avenged the death of her brother who had been slain by Pterelaus.

Alcimus, a high priest of the Zadokite family, was born about 200 B.C. He was a forceful leader of the Hellenistic party which so strongly opposed the Maccabees. Upon the defeat of the latter in 160 B.C., Alcimus, so the story goes, tore down the wall of the court of the inner temple at Jerusalem. It is thought that his intention was to rebuild the temple on a much larger scale.

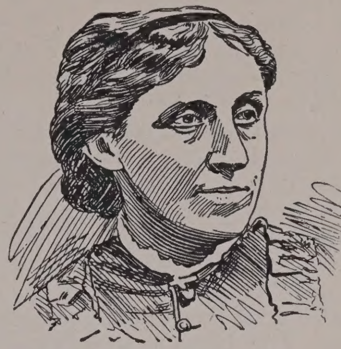
Alcinous (*ăl-cĭn'ō-ŭs*), a mythical king of the island of Scheria (now Corfu) described in the *Odyssey*. Being separated from other people, he and his people lived in unbroken peace and prosperity. The description of the king's palace with its fine furnishings, and its wonderful court containing the orchard of everbearing trees and vines is well known and is quite remarkable. The chief employment of the people was navigation. It was said that the ships were intelligent, and without helm or pilot could find any coast or harbor. King Alcinous received Ulysses near the close of the latter's long period of wandering. He entertained him hospitably and furnished him with a ship to carry him to Ithaca. Upon its return to Scheria this ship and its sailors were transformed to stone by Neptune as a mark of his wrath for the favor shown to Ulysses.

Al′ cohol, the spirit of fermented liquors. The word is of Arabic origin, and was originally used as the name of a kind of black paint used by Eastern women for darkening the eyes. It is not known why the word was applied to its present use. Alcohol is made from the juice of grapes, apples, etc., and from corn, grain and other materials containing starch, after the latter has been converted into sugar. When the juices or "mashes" ferment or "work", the sugar which they contain changes into the spirit alcohol. It has great affinity for water, which is to a great degree separated from it by distillation and other processes. When pure it is a deadly poison, and is the intoxicating principle in the so-called spirituous liquors. Brandy, whiskey, rum and gin, which are called distilled liquors, are about one-half alcohol; port wine about one-fourth or one-fifth, and claret and white wines one-tenth, while ale and cider have still less.

When alcohol is drunk it undergoes oxidation in the body, just as sugar, starch and other similar substances do. As a narcotic, it produces at first high spirits; then, as it gets possession of the nerves of feeling, stupidity; then when it has paralyzed the nerves of motion, insensibility; and, finally, if taken in large enough quantities, it reaches the heart and the result is death. Alcohol has many interesting properties and uses. As it never freezes at any natural temperatures, it is used in cold countries in thermometers. It is used in medicines by mixing it with drugs; in varnishes by mixing with resins and gums; and in cologne by mixing with oils. It is used in preserving specimens, as it is an antiseptic. Chemists find it a clean and valuable fuel.

Alcott (*awl′kot*), **Amos Bronson,** American educator, philosophical writer and one of the founders of the New England Transcendentalist school, was born at Wolcott, Conn., November 29, 1799, and died at Boston, March 4, 1888. His active life began by teaching in schools, founded by himself and on methods of his own, the teaching being imparted more by conversation than by books. Later on, he exchanged the schoolroom for the lecture platform, and became dean of the Concord School of Philosophy. At Concord, he was intimate with Emerson, Hawthorne, Thoreau and Channing, and was a frequent contributor to *The Dial.* Besides his *Table Talk* his best known work is his *Concord Days.*

Alcott, Louisa May, daughter of the above, was born in 1833 and died in 1888. Her books for children are perhaps the most popular works of the kind published in this country. Her *Hospital Sketches* are selections from letters written home from the army in 1863, where she was a volunteer nurse. Her best known books are *Little Women, Little Men, Old-Fashioned Girls, Eight Cousins* and *Rose in Bloom.*



LOUISA MAY ALCOTT

Alcuin (*ăl′kwin*), born in England about 735 A. D., and died in France in 804. He was educated in the cathedral school at York, England, and became head master of that school. He is, perhaps, best known for his labors in the celebrated palace school opened by King Charlemagne in France. Alcuin became the head of this school and, in addition to teaching, he had corrected copies made of classical manuscripts which had gradually become very inaccurate through careless copying. During his last years, Alcuin was abbot of the monastery of St. Martin in Tours, France.

Alden (*awl′den*), **John** (born 1599, died 1689), one of the Pilgrim fathers, who came over in the *Mayflower* in 1620. For more than fifty years he was a magistrate of Plymouth colony. Miles Standish once sent him to a lady with an offer of marriage, but she, liking John better, said, "Prithee, John, why do you not speak for yourself?" —and John married her. The story is told by Longfellow in his *Courtship of Miles Standish.*

Alder (*al′der*), hardy ornamental tree or shrub, fond of the water and the wood valued for its durability in water. It belongs to the genus *Alnus;* 20 species are known. A giant among these is the famous black alder of Europe, Asia and North Africa. The alder is widely distributed. In North America there are six species of trees and three of shrubs. "The alder by the river" is not only a very pretty feature of the landscape, but also of value to the land, keeping the banks from crumbling. The tree is not ranked with the more important timber trees, but is put to numerous uses; alder branches furnish the best charcoal for the making of gunpowder; from the bark and shoots is obtained a dye; the wood is turned to account in various small common articles, and is used for piles, pumps, watering-troughs, etc.

The Oregon or red alder is found in the far west, in Washington, Oregon and in the mountains of California down to Santa Barbara. It grows along streams, on canyon sides, and up on the mountains beyond the spruces. On Puget Sound the tree sometimes reaches the height of 80 feet. The bark is smooth and grayish, the leaves dark green. The wood is red-brown in color and is sometimes used for furniture.

The white alder also belongs to the west, borders mountain streams from Idaho down toward the Mexican line. It, too, is a tall tree for an alder. Very early in the year it puts forth great yellow catkins, at this season specially conspicuous and attractive. In the spring the unfolding leaves are covered with white hairs and the young shoots have a white crust. The bark is rough and dark brown in color.

The lanceleaf alder grows on high lands in Arizona and New Mexico. The paperleaf alder is another species found in the mountains of the west.

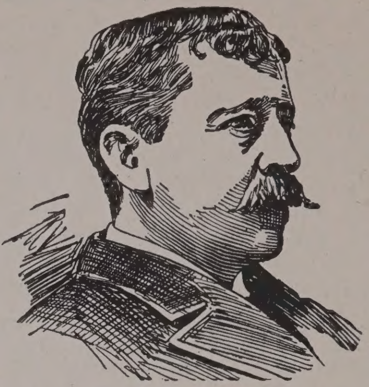
The seaside alder, an attractive small tree, is found fringing stream and pond in Delaware, Maryland and the Indian Territory. It is from 15 to 30 feet in height, its bark light brown, the leaves a gleaming dark green above, paler beneath. A feature of this tree is the beautiful yellow catkins with which it decks itself in September.

Plants of other orders are popularly called alders. Mention may be made of the winterberry or black alder, common on low grounds, closely related to the American holly, bearing thick-clustered coral-red berries, these appearing in September. The sweet pepperbush or white alder, a shrub in late summer adorned with fragrant white blossoms, grows along the New England coast.

Al'derman, Edwin Anderson (1861), American educator and president of the University of Virginia, was born at Wilmington, N. C., and educated at the University of his native state. Of the latter, in 1896-99, he was president, when he became head of Tulane University at New Orleans, La., subsequently removing to Charlottesville, Va., to take the presidential chair at the University of Virginia.

Aldrich (*awl'drĭch*), **Nelson Wilmarth** (1841-1915), U. S. Senator (Republican) from Rhode Island, born at Foster, R. I. For six years he was a member of the Providence Common Council, in two of which he acted as president. In 1875 he was a member of the Rhode Island General Assembly and in the latter was elected speaker of the state House of Representatives. In 1878 he was returned to the Federal Congress and in 1880 was re-elected, but in the following year resigned to take a seat in the Senate. He was successively elected to the Senate (in the years 1886, 1892 and 1905), and became one of the most forceful and efficient members of that body. He had charge of the tariff bill passed in 1909. He was also chairman of the commission appointed to revise the monetary system of the country. He died April 16, 1915.

Aldrich (*awl'drĭch*), **Thomas Bailey**, an American poet and novelist, was born in Portsmouth, New Hampshire, November 11, 1836. Between the years 1881 and 1890 he was editor of the *Atlantic Monthly*. He has written *The Stillwater Tragedy*, *Story of a Bad Boy*, *Marjorie Daw*, *Prudence Palfrey*, *Judith and Holofernes* and several volumes of poems. He died March 19, 1907.



T. B. ALDRICH

Ale. See BEER.

Alemanni (*ă'lā-măn'nē*) (meaning "all men"), a union of several tribes, who lived in the heart of Germany. They were attacked at different times in their history by nine Roman generals or emperors. They were defeated time and again, but never conquered. They were at last united with the Suevi into the dukedom of Alemannia, and thereafter their history is included in the history of Germany.

Aleppo (*ā-lĕp'pō*), a city of Syria, is built over the ancient city of Berœa. It is surrounded by a stone wall forty feet high and three and a half miles long. In an earthquake which occurred in 1822 two-thirds of the people were swallowed up. Outside the city beautiful gardens stretch for 12 miles to the southeast. The "boil of Aleppo" is a cancer that breaks out on the faces of children and lasts a year, leaving a scar for life, by which a citizen of the place can be easily recognized. Population, 210,000.

Aleutian Islands or Catharine Archipelago, a group of over 150 islands, volcanic as well as rocky in their foundation, which extend southwestward from the Alaskan peninsula across the northern Pacific and between the latter ocean and Bering Sea. They are populated by a hardy race, between 2,000 and 3,000 in number, allied to the Eskimo stock, who subsist chiefly on seals and fish. There is little agriculture, for the soil is thin and poor, and the vegetation is stunted and insignificant. The islands, which form part of Alaska and with that northwestern peninsula belong to the United States, were discovered early in the eighteenth century by Bering, the Danish navigator. The inhabitants as a rule are of a low order of intelligence, use primitive implements in their work, and live in winter in crude dugouts and underground dwellings. They have been Christianized by Russian missionaries and are nominally attached to the Greek church. Their food, in addition to the fish they catch, includes foxes and reindeer. The Fox Islands form the larger and more populous portion of the archipelago, which extends along both sides of the parallel of 55 north latitude, separating the Northern Pacific from the Sea of Kamchatka. See ALASKA.

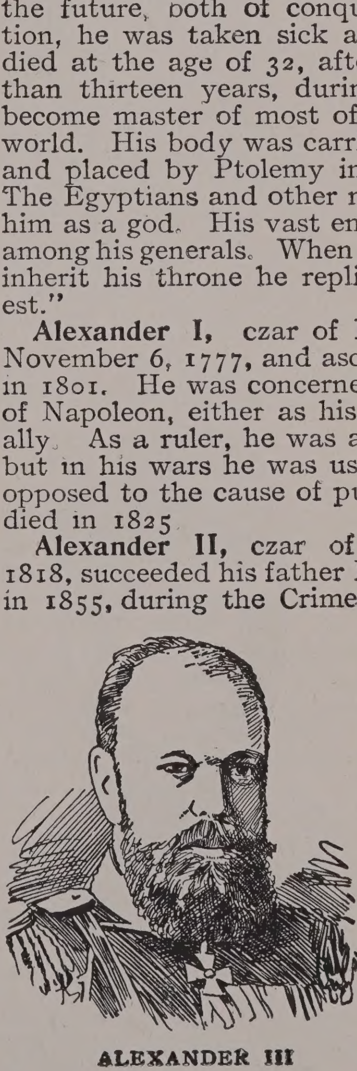
Alexander. See EMPEROR SEVERUS.

Alexan'der the Great, son of Philip of Macedon, was born at Pella, in 356 B. C. Gifted by nature and carefully educated by Aristotle, he early gave promise of his great character. Philip's triumphs saddened him, and he once exclaimed: "My father will leave nothing for me to do!" When only 16, he took charge of the government in his father's absence. Two years later he showed such courage in the battle of Chæronea that his father, embracing him, said "My son, ask for thyself another kingdom, for that which I leave is too small for thee." At Philip's death, Alexander, not yet 20 years old, ascended the throne and prepared to finish the conquests which his father had begun. He struck terror into all Greece by razing Thebes to the ground and punishing all who had revolted. He then turned toward Persia. Crossing the Hellespont, in 334, he defeated the Persians in a number of battles, overthrowing the son-in-law of King Darius with his own lance. The cities of Asia opened their gates to the conqueror as he marched to meet Darius and his army of 500,000, in the defiles of Cilicia. At the pass of Gordium was the famous Gordian knot. An oracle had foretold that whoever should untie it would become master of the world, but Alexander boldly cut it with his sword. Meeting Darius between the mountains and the sea, the resistless Macedonian phalanx utterly routed the disorderly masses of the Persians in the great battle of Issus, 333 B. C. The family of the Persian monarch fell into the hands of Alexander, and all Asia, as far as the Euphrates was offered as the condition of peace; but the conqueror proudly refused, saying that Darius must regard him as the ruler of all Asia and the lord of all his people. Alexander now turned southward and conquered the eastern coast of the Mediterranean. In Egypt he restored the religious customs of the people, which the Persian rulers had changed, and built the city of Alexandria. He visited the temple of Jupiter Ammon in the Libyan desert and was hailed as a son of the god. In the spring, he routed Darius again, at the battle of Arbela (331 B. C.). He marched to the interior, entering in triumph Babylon and Susa, the storehouse of the treasures of the East, and Persepolis, the capital of Persia. But these successes turned his head, and he began to lead a life of cruelty and dissipation. In a fit of anger he killed some of his best friends, and while drunk burned the beautiful city of Persepolis. In 320 B. C., Alexander marched northward to the furthest known limits of Asia and conquered the Scythians on the banks of the Jaxartes. Two years later, he invaded India. When a king named Porus was brought to him, Alexander asked him how he would like to be treated. "Like a king," was the reply, which so pleased Alexander that he restored him his kingdom, and Porus became an ally and friend. Here his favorite horse, Bucephalus, which no one else could ride, died from a wound. Alexander gave the horse a splendid burial, and founded a town, named Bucephala, in his honor. Alexander advanced through India, until his soldiers refused to follow him further. He sailed down the Hydaspes to the Indus, thence to the Indian Ocean.

He returned to Babylon, receiving on his way ambassadors from all parts of the world. Here, while forming new plans for the future, both of conquest and civilization, he was taken sick at a banquet and died at the age of 32, after a reign of less than thirteen years, during which he had become master of most of the then known world. His body was carried to Alexandria and placed by Ptolemy in a golden coffin. The Egyptians and other nations worshiped him as a god. His vast empire was divided among his generals. When asked who should inherit his throne he replied: "the worthiest."

Alexander I, czar of Russia, was born November 6, 1777, and ascended the throne in 1801. He was concerned in all the wars of Napoleon, either as his enemy or as his ally. As a ruler, he was able and humane, but in his wars he was usually on the side opposed to the cause of public liberty. He died in 1825.

Alexander II, czar of Russia, born in 1818, succeeded his father Nicholas I as czar in 1855, during the Crimean war. By his establishment of schools and internal improvements he did more to build up Russia than any emperor since Peter the Great. He gained the name of "Liberator" by giving freedom to the serfs. He was assassinated in 1881.



ALEXANDER III

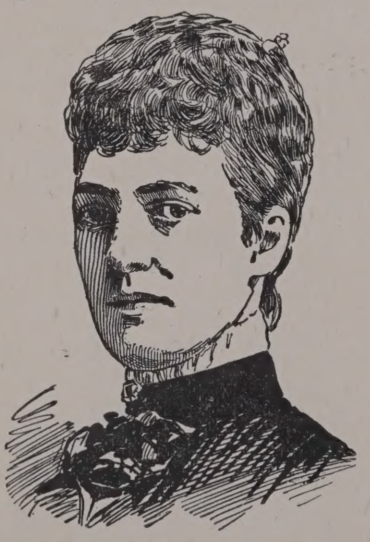
Alexander III czar of Russia

was born March 10, 1845. He succeeded to the throne in 1881 He showed vigor in government and ability in repressing the Nihilists (see the latter), who made several attempts on his life, and who assassinated his father, Alexander II. The harsh laws against the Jews and the severe famine (1892), are among the later events of his reign. In 1866 he married Princess Dagmar of Denmark (sister of **Alexander queen of England)** whose son, Nicholas II, succeeded Alexander III on the throne. He died November 1, 1894.

Alexander, the name of eight popes. Alexander VI has been called the worst of the popes, because the crimes of his son, Cæsar Borgia, were attributed to him. He was a profligate, but an able statesman and did much to advance the cause of the papacy He was born in 1431, and died in 1503. See BORGIA, CÆSAR.

Alexander, W. J., born at Hamilton, Ontario. Educated at Hamilton Collegiate Institute. Matriculated University of Toronto with double scholarship, 1873. Canadian Gilchrist Scholar, 1874. Student of University College, London, England, 1874–7. B.A University of London. Teacher in Prince of Wales College, Charlottetown, P.E.I., 1877–9. Graduate Student, Scholar and Fellow of Johns Hopkins University, Baltimore, 1879–1883. Ph.D., 1883. Graduate student in Germany, 1883–4. Professor of English Literature, Dalhousie College, Halifax, Nova Scotia, 1884–89. Professor of English, University College, Toronto, 1889—present time. He has written various books, *Introduction to the Poetry of Robert Browning; Select Poems of Shelley*; and various articles in learned periodicals.

Alexan'dra, Queen, consort of the late Edward VII of England, long known as Princess of Wales, daughter of the late Christian IX, of Denmark, was born at Copenhagen, December 1, 1844. On March 10, 1863, she was married at Windsor to Albert Edward (then Prince of Wales), eldest son of Queen Victoria and the Prince Consort. She has had six children, four of whom survive. Her majesty is widely loved and admired, she is a fine musician, eagerly interested in philanthropic works and devoted to her family life of which she is the center and inspiration. Died 1925.



QUEEN ALEXANDRA

Alexan'dria, a city of Egypt, founded by Alexander the Great, 332 B. C. Its site is near one of the mouths of the Nile, between the Mediterranean and Lake Mareotis. About a mile out in the sea is the island of Pharos, connected with the land by an enormous mole, on which Ptolemy built the famous lighthouse, 400 feet high, which was called one of the wonders of the world. He ordered as inscription on the lighthouse, the words: "King Ptolemy to the Gods, the Saviours, for the Benefit of Sailors." But the architect, Sostrates, put another inscription on the wall, covering it with mortar on which he wrote the words of the king. In later years the mortar fell off, and the hidden inscription appeared: "Sostrates, the Cnidian, son of Dexiphanes, to the Gods, the Saviours, for the Benefit of Sailors." The city was laid out in squares, with the tomb of Alexander the Great in the center. It was divided into the quarters of the Jews, of the Egyptians and of the Greeks. In the latter were most of the beautiful buildings for which the city was famous, the palace of the Ptolemies, the greatest of the libraries of ancient times, the museum, the court of justice and the temple of the Cæsars. This temple Julius Cæsar adorned with the two "Cleopatra's needles," which he brought from Heliopolis, and which have been given to England (1877) and to America (1880). Alexandria has been a great center of trade at different times in its history. The rise of Constantinople and the discovery of the passage to India by the Cape of Good Hope took away its importance; but the opening of the Suez canal has renewed its prosperity, and it is now growing rapidly. The city fell at various times under the power of the Romans, the Persians, the Arabs and the Turks. It was largely rebuilt under Mehemet Ali (who reigned from 1811 to 1848). In 1882 it was bombarded and held for a time by the English. It is now under English government. The modern city is built on the ancient mole. The population is 332,246, made up of a large number of nationalities.

Alexandria, Ind., a growing city in Madison County, situated about 50 miles northeast of Indianapolis on two lines of railway and having trolley connection with all principal towns and cities in Indiana and Ohio. With the discovery of natural gas in 1889 its growth for a few years was remarkable. On the failure of gas it lost many industries but since 1908 has enjoyed a healthy growth. Its manufactures include glass, mineral wool, wire and paper mill products. The city owns and operates its own waterworks. Population (1910), 5,200.

Alexandria, Va., a town, port of entry and railroad center in Alexandria County, of which it is the capital, is situated on the right bank of the Potomac, six miles southwest of Washington, D. C. The tidal waters of the Chesapeake flowing up the Potomac, afford a good and roomy harbor, the river here being a mile wide. It has a number of institutions of learning, among them Potomac, Mt. Vernon and St. Mary's Academies, the Washington High School, and the Theological Seminary and High School of the Diocese of Virginia (Episcopal). The town has several buildings of historic interest, among them being Christ Church where Washington worshipped· the Carlyle House, Braddock's headquarters in 1755; the school of which the first teacher was Washington: the old Town Hall, the first story of which was used by the fire brigade of which Washington was a member, etc. Alexandria has many factories, mills, machine shops and other industries. Population, 22,000.

Alexandrian Library, probably the largest collection of books ever gathered before the invention of printing. It was founded by Ptolemy I and Ptolemy II. of Egypt, and contained books in all languages. It was housed in two buildings, the Museum and the Serapeum. The number of volumes was said to be seven hundred thousand, but this would not amount to as much as a modern library of printed books of the same number, because at that time all books were written, and each part of a book was called a volume. Thus the *Iliad*, which now makes one volume, was then twenty-four volumes. Students came to this library from all parts of the world to study. When Julius Cæsar besieged Alexandria, a large part of the library was burned. Mark Antony, however, presented a new collection to Cleopatra from Pergamus, and the library went on increasing for four centuries, till the Serapeum was destroyed by command of the Emperor Theodosius The library was again re-established, but was burned a second time, about 640 A. D., when the Arabs conquered the city. The story is told that the Arab caliph, Omar, when asked to preserve the library, said: "If these writings of the Greeks agree with the *Koran*, they are useless and need not be preserved: if they disagree, they are pernicious and ought to be destroyed." So they were used to heat the four thousand baths of the city, and such was their number that six months were barely sufficient to use up the precious fuel.

Alexiev, Admiral E. S. Born in Russia in 1844, and educated for the navy. During the Chino-Japanese War in 1897, he was the chief of the eastern fleet; later he was the chief of the Black Sea fleet. In August, 1903, he was appointed viceroy of the Far East with supreme command of the land and naval forces. When the Russo-Japanese War broke out and the Russians met reverses, Alexiev was superseded in command both of the army and navy, and left in charge of the civil administration only. He has been severely censured for either being ignorant of the state of affairs in Japan prior to the war or for concealing his knowledge of the situation from the czar Nicholas II. Alexiev belongs to the reactionary faction in the Russian government.

Alfalfa, from an Arabic word meaning "the best fodder," the *Medicago sativa* of botanists, is a forage plant belonging to the botanical family *Leguminosæ*, of which all clovers, beans and peas are examples. It is known by many other names, of which the most common is lucerne; it is a perennial, with powers of indefinite reproduction from one seeding, and fields of it are claimed to have been continuously productive without reseeding for from one to two hundred years or more. It is a smooth, upright, branching plant, with leaves three parted, arranged alternately, and netted-veined, and produces many stems from one seed or root. Its flowers are purple, and appear in clusters on the stems and branches; its seed-pods are coiled spirally, each containing several seeds, which are kidney-shaped and olive green or bright egg-yellow in color.

Alfalfa is native to Asia, and was familiar to the Egyptians, Medes and Persians, Greeks and the Romans, who distributed it over large portions of southern Europe. Early in the history of the western continent the Spaniards carried alfalfa to South America. It was introduced probably about 1853 into the United States, in northern California, but attracted no great attention until more recent years. It is the richest forage plant known, and doubtless destined to come into general use in most of the states. In fact it is already grown successfully in greater or less areas in every state in the Union, whereas a few years ago its profitable production was thought possible only in the irrigated valleys of the west, being deemed adapted only to certain conditions found in the so-called semi-arid section, but it is now produced under greatly varying conditions of soils, climate and altitude, and this adaptability gives its growing a wide range. There are but two soil conditions that seem reliably against the successful growth of alfalfa. one is a soil generally wet, the other is too much soil acidity. The latter may be remedied by applications of lime, the other requires drainage. Alfalfa is exceedingly rich in protein, the property in which corn and most other crops are deficient, and hence its hay serves admirably to balance the feeding ration, saving the purchase of high-priced feeds, such as bran, for instance, which, pound for pound, it approximates in value. Its great value to the husbandmen may be further appreciated by the fact that it yields from three to twelve tons per acre per season. One experiment station reports that "one acre of alfalfa yields as much protein as three acres of clover, as much as nine acres of timothy and twelve times as much as an acre of brome-grass." Unless a seed crop is desired, it is cut regularly whenever the first blooms appear, which in some regions is every month in the year, but three to five cuttings per annum would probably be an average range.

It restores and enriches rather than depletes the fertility of the soil in which it grows, supplying it with nitrogen collected from the atmosphere in nodules on its roots, in greatest abundance for other succeeding crops. Its long penetrating roots, reaching to great depths, not only give it unusual powers of resistance to protracted dry weather, but draw from subterranean recesses large quantities of mineral elements which other crops would never reach, and decaying leave these readily available for future crops of whatever kind. The action of its wonderful root-system constitutes it in effect a gigantic subsoiler, and humus is constantly added to the soil by the decay of its fibrous roots, continually branching from the main tap-root. The soils on which alfalfa is grown are wonderfully changed in chemical elements and physical character, and it has been denominated as the greatest fertilizing and soil renovating plant known to agriculture.

Its palatability and succulence cause live stock of all kinds to eat it with extreme relish, uncured or as hay, and it is especially prized as a factor in dairy husbandry, affording at lowest cost the most important ingredients of the feeding rations. It is also used as pasturage, but ruminants such as cattle and sheep are not safely grazed upon it, owing to its liability to cause bloat (hoove), often resulting in speedy death.

No diseases of alfalfa are as yet common in America, and it is said more failures in growing it are caused by weeds than all its other enemies and pests combined. Well-prepared seed-beds and the most favorable conditions are demanded for the prosperity of the seed and the young plants during the earlier stages of their growth, if the fullest measure of success is to be attained. Wherever extensively grown, alfalfa has revolutionized the conditions of agriculture, and one of the most eminent agricultural and dairy authorities in the United States recently declared it as his belief that "the alfalfa-growing movement is the most important agricultural event of the century."

F. D. Coburn.

Alfieri (*ăl-fē-ā'rē*), the founder of Italian tragedy. He was born in Piedmont in 1749, and after a brief period of study at Turin traveled several years on the continent, spending his time, however, in dissipation. A few chance verses, written at the bedside of a friend, stirred in him a passion for tragedy, and he turned his energies to the study of literature. He wrote twenty-one tragedies, besides other poetry, including five odes on the American Revolution. His dramas, though simple in style, held an Italian audience spellbound. *Saul* is his most successful tragedy. Count Vittorio Alfieri died at Florence in 1803. His tomb is in the church of Santa Croce, in Florence, next to the tomb of Michael Angelo, and over it stands a monument by the sculptor Canova.

Alfonso (*alfon'so*), a name borne by twenty-two sovereigns in the Spanish peninsula.

Alfonso I of Portugal (1110–1185) was the founder of the Portuguese kingdom. He is said to have been over seven feet in height, and was a successful fighter against the Moors and Spaniards.

Alfonso VI, of Leon and Castile (1030–1109), inherited only a part of his father's kingdom, in which his brother and sister shared, but by a series of wars he conquered the greater part of their territories, and fought the Moors vigorously.

Alfonso X, of Leon and Castile, was engaged during his reign in putting down revolts, in fighting the Moors and in two attempts to make himself emperor of Germany. Era, 1221–1284.

Alfonso V, of Aragon, also ruler of Sicily, Sardinia and Naples, was born in 1385. His determination to conquer Naples, after long wars, at great odds, was finally successful. Alphonso was one of the best kings of his name. He was brave, showed great generalship, was generous, loved books, and gave encouragement to law and justice. He died at Naples in 1458.

Alfonso XIII, king of Spain, is the son of Alfonso XII of Spain and of Maria Christina, Archduchess of Austria. Alfonso XIII was born on May 17, 1886, shortly after the death of his father, and during his minority his mother acted as regent. Before he ascended the throne, there were serious uprisings in the Philippine Islands and in Cuba. In 1898 war broke out between the United States and Spain, and as a result of it Spain lost Cuba, Porto Rico and the Philippines. The young king took the oath of office May 17, 1902, and shows strong tendencies towards progressiveness in government. In 1906, he married the Princess Victoria Eugenia, daughter of the late Prince Henry of Battenburg and Princess Beatrice, youngest child of Queen Victoria of England. An heir to the throne was born May 10, 1907. Another son was born June 22, 1908.

Alfred the Great, king of the West Saxons, was born at Wantage, Berkshire, in 849. The youngest of four sons, he succeeded to the crown on the death of his brother Ethelred at the age of 22. He had already given proof of ability as a general in driving back the constant invasions of the Danes, the most terrible warriors of Europe, and a large part of his reign was spent in preserving the liberty of his country against these northern foes. At first he was unsuccessful, and by 878 the invaders had overrun the entire kingdom of the West Saxons, while Alfred was driven into its forests. But he refused to be beaten, and soon the tide of fortune turned. Building a stronghold on an island in the wastes of Somersetshire, still known as Athelney (the island of the nobles), he made frequent sallies against the enemy, and soon found himself at the head of an army with which he totally defeated them. He then built England's first fleet and soon grew so powerful, both by land and sea, that he was recognized as sovereign of all England. During the years of peace which followed Alfred busied himself in rebuilding the cities which had suffered in the wars, in training the people in the use of arms and in founding those wise laws and institutions which helped so much in making England great and happy in later years. In an age of ignorance he was a fine scholar, and did much in founding schools and encouraging literature. Toward the close of his reign, after a hard contest of three years, he was again victorious over his old enemies, the Danes. He died in 901, leaving his country in peace and prosperity as the result of that wise and energetic rule which endeared him to all Englishmen as their best and greatest ruler.

Algæ (*ăl'jē*). One of the great divisions of ***Thallophytes*** **(the lowest group of plants),** being distinguished from the *Fungi* by containing the green coloring matter known as chlorophyll. This enables them to manufacture their own food and so to live independently of all other organisms. They are of special interest as representing the most primitive forms of the plant kingdom, from which all other groups of plants have probably been derived. They are exclusively water plants either living in the water or in damp places, and are commonly known as "seaweeds," although they are abundant in fresh as well as in salt water. Their bodies are of various sizes and degrees of complexity. Some are only a single cell and are microscopic in size, while others are very complex and huge in size, as the giant kelps of the ocean. There are four great groups of *Algæ*, named for their differences in color. The *Cyanophyceæ* or blue-green algæ are the simplest, and are characterized by possessing a blue pigment in addition to the green chlorophyll, which gives them a bluish-green hue. The *Chlorophyceæ* or "green algæ" have no other pigment than the green chlorophyll. These two groups are characteristic of fresh waters, although they have their marine representatives. The two following groups are characteristic of salt waters, but have representatives in fresh waters. The *Phæophyceæ* or brown algæ have a yellowish to brown pigment in addition to the chlorophyll, which gives their bodies various shades from olive to yellow and brown. They include the common large and coarser seaweeds cast up by the waves. The *Rhodophyceæ* or red algæ have a red pigment in addition to the chlorophyll, and their graceful and often very delicate bodies, beautifully tinted with various shades of red, are among the most attractive plants of the seashore. For a further account see under the names of the four groups.

John M. Coulter.

Algebra deals chiefly with general values instead of special values. The difference between algebra and arithmetic will not seem so great to us if we consider algebra largely as a different way of looking at the problem. In arithmetic we learned that a plane surface 5 feet wide and 8 feet long contained 40 square feet. Now, if we assign general values, or letters, to the width, length, and product, and say $w \times l = a$, we are approaching algebra. If a person would say, "A certain number, plus twice that number, plus 5, equals 65; what is the number?" we could easily solve the problem by algebra, letting x equal the ‘certain number." Thus: $x+2x+5=65$. Then $x+2x=65-5$. So $3x=60$; and $x=20$. Here is another involving fractions: "A goose weighs six pounds plus half its whole weight; what is the weight of the goose?" We will let x equal the whole weight of the goose. Then its whole weight, or x, equals 6 pounds plus half its whole weight, or x divided by 2. Thus: $x=6+\frac{x}{2}$. Now we know by arithmetic we may "clear fractions" or take the 2 from underneath the second x if we multiply the first x and the 6 by 2. So $2x=12+x$; therefore, $2x-x=12$, or $x=12$.

Algebra includes addition, subtraction, multiplication, division, squares, cubes, linear and quadrilateral equations, and other divisions. Boys who are thinking of becoming mechanical or electrical engineers, or of going to the average college and taking technical courses, must have taken algebra. As we go further in the study of mathematics we begin to work problems by a combination of algebra and geometry, and we enter fields of higher mathematics, as trigonometry and calculus.

Some problems are solved more easily by algebra than by arithmetic. Indeed, as we proceed in mathematics we come to understand that algebra is the only practical method of solving certain problems, and is of great assistance in working other divisions of mathematics. Generalization of thought gives principles. Generalization of certain mathematical factors, likewise, assists the exact science of mathematics.

Algeciras (*ăl'je-sē'ras*) **International Conference,** on Morocco matters, held at Algeciras, Spain (opposite Gibraltar), in January, 1906. The Conference, after a period of extreme diplomatic tension between the European powers, caused by the exception taken by Germany to the trade control of Morocco by the Franco-British-Spanish agreement settled matters more agreeably to Germany and signed a "General Act" embodying a concession for a state bank at Tangier, the suppression of the illicit traffic in arms, the control of the police, together with provision for an open door as regards trade and the exactions of the Customs. Later in the year, Morocco was disturbed by serious tribal disputes in the Mogador district, and by much unrest in the southern Franco-Moroccan frontier.

Alger (*ăl'jẽr*), **Russell Alexander,** American general, politician and ex-secretary of war in President McKinley's administration, was born in Lafayette, Ohio, February 27, 1836, and was educated at Richfield Academy, Ohio, studied law, and was called to the bar. Removing to Michigan, he entered the army as captain in the Second Michigan Cavalry (1861), and two years later became colonel of the Fifth Michigan Cavalry, and subsequently reached the rank of brevet major-general of volunteers. He was severely wounded at the battle of Boonsboro, Md., July 8, 1863, and performed meritorious service at Gettysburg and in the Shenandoah valley. After the war he became interested in the lumber business in Detroit, and owner of extensive timber tracts. In 1885–6, he was governor of Michigan, and on March 5, 1897, was appointed United States secretary of war. In 1901 he was elected to the United States senate, where he served until his death, January 24, 1907.

Alge'ria, a French colony in northern Africa, fronting on the Mediterranean, and comprising besides Northern Algeria, with 17 arrondisements and 350 communes, South Algeria, which extends far to the south and west, and embraces the vast Saharan oases organized into four territories in 1905. The area of the Algerian Sahara effectively occupied is estimated at about 193,000 square miles, including the zones, in the southwest, with a population numbering about 62,000. The two regions (North Algeria has an area of 184,474 square miles), have a total area of about 343,500 square miles, with an aggregate population of 5,563 828. Of these all but 795,522 Europeans are natives —Arabs, Berbers, Tunisians, Moroccans and Musulmans. The extent of French possessions in Africa is very large, its area extending from the Mediterranean, and including the region of Tunis, in the north to the Gulf of Guinea in the south together with the French Congo district, to the southeastward, and covering also all of French West Africa and the Sahara to the Atlantic, including French Guinea, the Ivory Coast, Dahomey, Upper Senegal and the Niger region, besides French Somaliland on the Gulf of Aden, at the foot of the Red Sea.

Government. The government and administration of Algeria are centralized at Algiers under a governor-general, who represents the authority of the French Republic throughout Algerian territory. He is assisted in his duties by a council; while each department sends one senator and two deputies to the French National Assembly. The country was at first (1830) placed under military rule but in 1834 a Governor-General was appointed as executive and given the assistance of a council. Later this system was abolished and affairs conducted entirely from Paris. In 1860 the Governor-Generalship was nominally restored and by degrees, a larger amount of autonomy has been given but the relation of Algeria to the French Central Government is not that of one of our States to our National Government.

Resources. With a soil naturally so rich that it was famous in Roman days, Algeria's productive area has been largely extended by the French by sinking Artesian wells in desert places. Wherever there is water the land brings forth abundantly wheat, barley, oats, vegetables and fruits. Algerian oranges are to the French boy what Florida and California oranges are to the American boy. During the American Civil War a good deal of cotton was grown but with the resumption of shipments to Europe after the war this industry declined, although a small amount is still grown. Olives, tobacco and grapes are raised in abundance and tobacco, wine and olive oil exported, as are hides, fish and shell fish. Algeria has extensive deposits of iron, lead, zinc, copper, mercury, onyx, marble and immense phosphate beds, the bones of ancient monsters of the water and the marshes when the sea extended into Algeria. Besides the live stock to which we are accustomed the Algerians have thousands of camels. Algiers, the capital, and chief seaport, has 110,000 population.

History. Algeria is an old country. Its prince was an ally of Hannibal, and it became a Roman province under the Cæsars. It was successfully conquered by the Vandals, by Belisarius, by the Saracens, the Morabites (an Arabian religious sect), the Spaniards and the Turks, who taught Algerines to be the dreaded pirates they were. Many thousand Europeans were captured and enslaved by them. This piracy grew so unbearable that the English, Dutch and French sent fleets at different times to suppress it. The French, at last, in 1830, conquered Algiers, but there were numerous revolts, especially that of Abd-el-

Kadir, before France became fully master of the country and the life of a Frenchman was safe outside the walls of the capital.

Algiers (*ăl-jeerz'*), capital of Algeria, is divided into two parts. The newer portion, along the harbor, is European; the older, on the hillside above, is Arab. It is an important French coaling station on the Mediterranean. Population, 138,240.

Algo'ma, one of the northern districts of the province of Ontario, offers great attractions for settlers. Contains millions of acres of productive land easily reached, very suitable for live stock and dairying. Bounded by the district of Nipissing on the east. It includes the Temiskaming settlement. Its northern boundary is that of the province itself, viz.: Hudson Bay and the Albany River. These two districts of Algoma and Nipissing taken together have an area larger than that of any European country except Russia. These districts are in that belt of the world which has ever been the most famous for the production of grasses, vegetables, fruits and cereals. The important industrial center of Sault Ste. Marie, only 193 miles north from the latitude of Toronto (population 13,000), is in Algoma. The timber and mineral wealth of the district is immense. The richest and most extensive nickel belt in the whole world is in Algoma.

Algon' quins, one of the two great families of Indians that formerly occupied the Mississippi Valley and the regions east of it. The Indians of New England were Algonquins. The largest tribe left is the Chippewas.

Algon'quin National Park. In northern part of the province of Ontario (from 1,500 to 2,000 feet above sea level). On the Ottawa division of the Grand Trunk Railway, which extends into the park itself, only 200 miles north of Toronto (quickly and comfortably reached), and 175 miles west of Ottawa, the capital city of Canada. Most attractive to travelers and tourists. A magnificent preserve set apart by the province for a park; beautiful lakes and rivers, 1,200 in number; abundance of fish. Wild forests of heavy timber and pure, health-restoring air; a total area of 1,800,000 acres of forest, lake and stream; called Lakeland. Red deer and moose (hunting not allowed in the park) plentiful and increasing in number. The highest summer resort in eastern Canada. The railway stations are located on picturesque lakes. Teeming with fish (speckled, gray and salmon trout). A paradise for campers. The Naganetawan River takes its rise in the park.

Alhambra (*ăl-hăm'bră*), the ancient fortress and residence of the Moorish monarchs of Granada, situated on a hill overlooking the city of Granada, Spain. This famous palace was built between 1248 and 1354, and though greatly marred by its Spanish conquerors in succeeding ages still contains marvels of beauty, taste and ingenuity. The surrounding gardens, with their waterfalls, fountains and shady ravines, caused the Arab poet to liken the whole effect to "a pearl set around with emeralds." It is divided into countless apartments, vast halls, ranges of bedrooms and summer rooms, whispering galleries, a labyrinth and vaulted tombs. Passages from the *Koran* adorn the various walls. Among the most famous courts are the Hall of Ambassadors, with its splendid throne of the sultan, and the Court of the Lions, with its magnificent fountain, supported by twelve marble lions. A famous description of this palace is to be found in Washington Irving's *Alhambra*.

Alicante (*ä'lĭ-kän'tā*), **Spain,** a province of the Spanish kingdom, area 2,185 square miles, with a population of 483,986; also a strongly fortified town and seaport on the Mediterranean, situated north of Cartagena and south of Valencia, population 51,165. Here, on an eminence overlooking the sea, is the castle of Santa Barbara. The town, which is a delightful seaside resort, is picturesquely situated, and has a picture gallery, library, several parish churches, two nunneries and a number of fine squares and promenades. Being the port of its own and the Valencia province, its export trade is considerable, chiefly of wine, oil, tobacco, silk and grain. There is a resident United States consul in the town.

Alison (*ăl'ĭ-son*), **Sir Archibald** (born 1792, died 1867), an English historian. His work, the *History of Europe*, covers the period from the French Revolution to the Peace of 1815. It was in its day very popular and had a sale of over five hundred thousand volumes. It, however, is not of the highest authority, because of its author's partisanship and its many inaccuracies.

Al' kali, an old chemical term used to denote soluble caustic hydroxides. The alkalies proper are potash, soda, lithia, rubidium and cæsium hydroxides and ammonia. Potash is called the vegetable alkali, soda the mineral alkali and ammonia the volatile alkali. Lime, magnesia, baryta and strontia are called alkaline earths, because they have some of the properties of alkalies. That which especially distinguishes an alkaline substance is the power it has of turning a vegetable blue, green; or a vegetable yellow, reddish brown. Alkalies belong to a general class of substances called bases, which are oxides of metals (usually combined with water), or compounds containing carbon and nitrogen called organic bases, all of which unite with acids to form salts. Alkalies and acids neutralize each other, and the usual caustic or bitter taste of the alkali and the sour taste of the acid usually disappear when a salt is formed. A familiar example is the addition of soda (alkali) to sour milk (acid), which neutralizes the acid, or destroys the sour taste. An alkali also unites with oil or fat to make soap.

Al' kaloids, a class of substances that occur in plants, some of which are very poisonous, and many are very valuable medicines. All of them are bases, that is, they unite with acids to form salts, and in many cases the salts are used medicinally. All alkaloids contain carbon, nitrogen and hydrogen and usually oxygen also. Some of the most important alkaloids are theine of coffee and tea, nicotine of tobacco, morphine from opium, quinine from Peruvian bark, as well as strychnine, atropine, cocaine etc.

Allahabad (*ä-lä-hä-bäd'*), capital of the northwestern provinces of India. The name of the place means "City of God." It is built at the junction of the Ganges and Jumna Rivers. Its fort is strong and commands both rivers. Within the fort are the remains of a splendid palace of the Emperor Akbar. Many Hindus make pilgrimages to Allahabad because of its sacred rivers. It also forms the junction of the great railway system that unites Bengal with Central India and Bombay. Population about 172,000.

Allan, Hon. George W., born in Toronto in 1822. Educated at Upper Canada College. Called to the bar in 1846. Was Chancellor of Trinity College. Toronto; a fellow of the Royal Geological Society (England); was mayor of Toronto in 1855; a legislative councillor from 1858 to 1867; called to the Senate of Canada in 1867; speaker of the Senate from 1888 to 1891. He died in 1901.

Allan, Sir Hugh, born in Ayrshire, Scotland, 1810. His father was a ship master; entered a counting house at the age of 13, went to Canada in 1826. In 1851, the firm of which he was a member began to build iron screw-steamships, and their first boat, "The Canadian," made its first trip in 1853. In 1854 the mail service was begun. It has continued ever since. The history of the Allan firm is that of Canadian maritime commerce. Their fleet has long been one of the first in point of general merit in the world. Their steamers have been used as transport ships by the British Government. A director of several important industrial concerns; received knighthood in recognition of his great services to foreign and domestic commerce; died December 8, 1892.

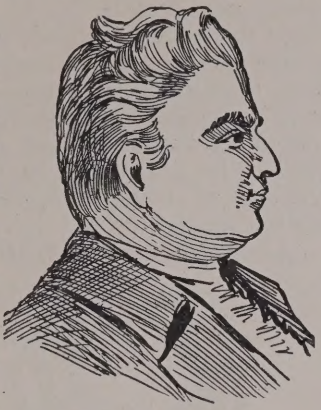
Alleghany (*al'e-ga'ni*) or **Appalachian Mountains,** the great range of mountains which extend from Canada to the northern part of Alabama. The greatest width of the main range is in Pennsylvania and Maryland, about 100 miles in extent, and its length is 1,300 miles. While varying little in height, the ridges follow a remarkably straight course, sometimes keeping an almost straight line for 50 or 60 miles. Included in this range are the Green Mountains of Vermont, the Highlands of the Hudson, the Catskills, the Blue Ridge and west of it the Alleghanies proper. Nowhere do these mountains reach the snow line. Mitchell's Peak, in North Carolina, 6,688 feet, is the highest point, while Mt. Washington, in New Hampshire, 6,293 feet high, is the most famous peak. The Alleghanies are one of the great sources of supply for the whole country of iron and coal.

Allegheny, formerly a separate city at the junction of the Allegheny and Monongahela Rivers opposite Pittsburgh (q. v.) was united in 1907 with Pittsburgh, with which it is connected by numerous bridges and electric lines. Surrounding the main business section is City Park of 100 acres and farther out Riverview Park (219 acres), in which is the Allegheny Astronomical Observatory. The Carnegie Library and three theological seminaries, the Presbyterian, United Presbyterian and Reformed Presbyterian, are located here. Allegheny, as a separate corporation, had a flourishing and efficient public school system which is now a part of that of Greater Pittsburgh. The University of Pittsburgh, originally the Western University of Pennsylvania and located in Allegheny, is now in Pittsburgh. On the hills are the beautiful homes of wealthy men and the city is noted for its numerous and handsome churches. Its manufacturing interests extend for miles along the river front and include slaughtering and meat-packing, rolling mills, foundries and machine-shops, preparation of pickles, preserves and sauces, works for making locomotives and railroad equipment, structural iron and plumbers' supplies. Vast quantities of coal are shipped down the Ohio. A curious and interesting fact in the history of Allegheny is that it suffered severely in 1874 from a fire started by a boy's firecracker on July 4. Its public institutions include the Riverside State Penitentiary, hospitals, homes for orphans and the friendless, and an industrial school.

Allegheny River rises in Potter County, Pa., and flows northwest into New York, then south-southwest, and, after a course of 400 miles, unites at Pittsburg with the Monongahela to form the Ohio. It is navigable for small boats for a short distance.

Allen, Miss Florence E., an associate justice of the Ohio Supreme Court. Miss Allen has the distinction of being the first woman in history to occupy a high court position, taking the oath of office December 16, 1922. Prior to her election she had been for two years a judge of the common pleas court of Cleveland. While a common pleas court judge she won for herself an enviable reputation for discerning judicial ability of a very high order, and her energetic enlivening of court procedure was greeted with commendation by students of our judicial system. She possesses not only a sane judicial temperament, but is an able lecturer, and is broadly interested in the advancement of education in both its applied developments and its organization.

Al′len, Ethan (born 1737, died 1789), a brigadier-general in the American revolutionary army. In 1775, after the battle of Lexington, he gathered a small company of his "Green Mountain Boys" and marched against the fortresses of Ticonderoga and Crown Point. Landing with 93 men, just before daybreak, he surprised the fort, getting inside and forming his men on the parade ground where they awoke the sleeping garrison with a shout of victory. The British commander rushed out in his nightclothes and asked: "What does this mean?" He was ordered to surrender. "In whose name?" he asked. "In the name of the Great Jehovah and the Continental Congress," replied Allen, and the fort was surrendered. In the attempt to take Montreal, at the head of a small body of troops, he was captured after a sharp engagement and sent to England. After his release and return to America, he was appointed commander of the Vermont state militia.


ETHAN ALLEN

Allen, James Lane, American *littérateur* and novelist, hails from the Blue Grass region of Kentucky, having been born near Lexington, Ky., in 1849. After graduating at Transylvania University, he taught Latin and the higher English branches at Bethany College, West Virginia, though, since 1885, he has devoted himself entirely to literature. He is a delightful and realistic writer, and in all his books he shows himself to be an ardent lover of nature. His early work consisted of sketches and studies, dealing thoughtfully and freshly with Kentucky life, contributed to *Harper's Magazine* and *The Century*. His novels, most of which have an historic background in his loved Kentucky state, include *A Kentucky Cardinal, The Choir Invisible, Two Gentlemen of Kentucky, Aftermath, Flute and Violin* and *The Reign of Law*. Died, 1925.

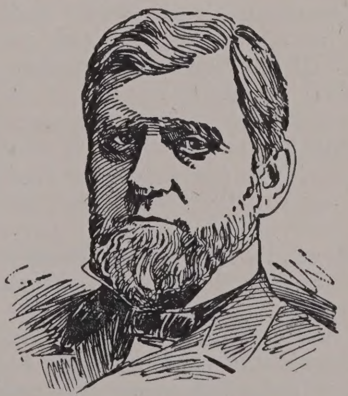
Allentown, Pa., the county seat of Lehigh County, was incorporated as a borough in 1826. It is situated at the junction of the Lehigh and Little Lehigh Rivers. It has excellent natural drainage and is located in a rich agricultural district. It originally was known as Northampton. It was named Allentown in honor of James Allen, who at one time owned the greater part of the land on which it is built. There are several beautiful springs near Allentown, which are justly admired by all who have seen them.

Allentown has excellent railroad facilities, and its trolley lines, radiating in every direction, make it easy of approach from all sides. Its proximity to the cement and slate regions of the county furnishes employment to many of its people. Owing to the depreciation of blast furnaces in the east, these have been supplanted by the wire mill, furniture and shoe factories, silk and jute mills and other industries. It has a school population of over 10,000, and is also the seat of Muhlenburg College and the Allentown College for Women. It has a population of 78,000.

Alli′ance, a city of Stark County, Ohio, situated on the Mahoning River, 56 miles from Cleveland. It is in a fine agricultural region and has importance as a manufacturing city. Among its products are agricultural implements, terra-cotta ware, white lead; and its steel works manufacture boilers, cranes, steam hammers, drop forgings and structural iron. Alliance was incorporated as a city in 1854, and its most important school, Mount Union College, was established in 1850, when the settlement was called Freedom. It has the service of several railroads, and the population is 26,000.

Al′ligator, a large reptile found in the rivers and swamps of the southern United States, and also in South America. It is closely related to the crocodile of the Eastern Hemisphere, and is commonly confused with it, but differs in having a broader head, a blunter snout, more teeth and other small peculiarities. The adults rarely attain 12 feet in length. Its back and sides are covered with very hard plates, but it is easily wounded in the belly. Its natural food is fish, muskrats, etc., and it is extremely fond of dog-meat. The female alligator lays from 50 to 60 eggs and buries them in sand, where the heat of the sun hatches them. As soon as hatched the young seek the water. Many doubtful stories are in circulation regarding the habits of both adults and the young.

Al′lison, William B., an American statesman, was born in Ohio in 1829. He went to Iowa and was on the governor's staff, helping to enlist volunteers at the outbreak of the war. He was elected to Congress in 1862 and served four terms in the house. In 1873 he was made United States senator, and was re-elected in 1878, 1884, 1890, 1896, 1902 and 1908. He died Aug. 4, 1908.


WILLIAM B. ALLISON

Alliteration, the frequent recurrence of the same letter or sound at the beginning of words. It occurs most often in poetry, and polyphonic prose. "Alliteration's artful aid" is a familiar example. Instances of it are often found in the Elizabethan writers and in those of early Anglo-Saxon times, chiefly in the poetry. Examples are occasionally found in prose, where, when skilfully used and combined with assonance, alliteration heightens the effect of what is written or said; but its use, in both prose and verse, is often more of a trick in a writer, and should therefore be indulged in sparingly. In Shakespeare it is often found, as in the phrase occurring in the song in *The Tempest,* "full fathom five thy father lies." It is also frequently found in Spenser, and in Langland's *Piers Plowman,* as well as in the modern German writers, such as Goethe and Heine, where it is occasionally used with pleasing effect. Fine examples are also to be found in Tennyson and Swinburne. Among other modern English authors Coleridge uses it as an embellishment of his verse, thus:

"The fair breeze blew, the white foam flew,
  The furrow followed free."

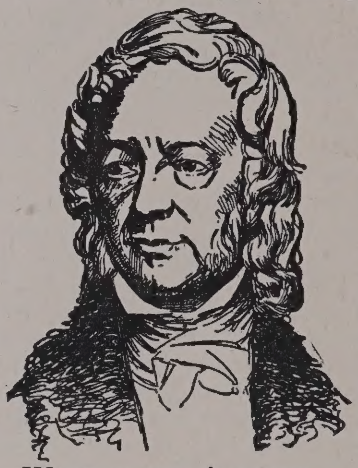
How much the use of alliteration is the mere trick of a writer may be seen in the couplet:

"Cossack commanders cannonading come,
Dealing destruction's devastating doom."

The use of alliteration is familiar to many in the proverbs and phrases in current speech, as in "life and limb," "out of house and home," "the bonnie bairn," "with peril and pain," "warring words," "the scum of the streets," "a vile varlet," "a dainty dame," "zeal, zest," "a rascally rogue," and "the merry month of May."

Allotropy (*ăl-lŏt′rô-pĭ*) or **Allotropism,** a chemical term to explain a conversion or change in physical property, but not in substance, in certain bodies. More explicitly, it is the property or capability which certain bodies show of assuming different forms and qualities under a presumed diversity of molecular arrangement. Examples of allotropic conditions are seen in carbon, sulphur, phosphorus and oxygen; practical instances are carbon (1) in its soft state, as in plumbago, black lead and charcoal and (2) hard and crystallized as in the diamond. Phosphorus is another instance of this dual property: (1) as a colorless wax-like solid, poisonous and dangerously inflammable, and, (2) as a red powder with neither of these destructive qualities. Similar contrasts are seen in oxygen and ozone.

Alloy, a mixture of two or more metals melted together. Some of the metals, when combined with others, are rendered more serviceable for certain uses. Thus copper alone is not fit for castings, and is too tough to be easily worked by tools, but when alloyed with zinc, forming brass, it can be cast, rolled or turned. Gold and silver, also, when pure are very soft and easily worn out. They are hardened by alloying them with other metals in different proportions. The silver coins of the United States are made up of nine parts of silver and one of copper, while the gold coins consist of nine parts gold and the other part is divided into one-quarter silver and three-quarters copper. Alloys are generally harder and much more fusible than would be indicated by the hardness and fusibility of the component metals. Besides the alloys that have been mentioned, some important ones are bell-metal and bronze, consisting of copper and tin; type-metal, containing lead and antimony and sometimes tin also; German-silver, composed of copper, nickel and zinc; and solder, which is ordinarily made of lead and tin. Alloys of which one metal is mercury are called amalgams.



Washington Allston

Allston (*ôl′stŭn*), **Washington,** an American historical painter and poet, was born at Waccamaw, South Carolina, in 1779. He was graduated at Harvard in 1800. He pursued the study of his art in Charleston, London, Paris and Rome. During his studies he formed a close friendship with the great painter, Benjamin West, and also with Coleridge and Thorwaldsen. He practised his profession mainly at Boston and Cambridge. Allston was of a deeply religious nature, as his pictures show. He has been called the "American Titian." His friend Coleridge says of him that he was surpassed by no man of his age in artistic and poetic genius.

Among his best known writings are: *The Sylphs of the Seasons* (1813); *Monaldi,* a novel (1842), and *Lectures on Art* (1850). His most famous painting is *Belshazzar's Feast,* a work which remained unfinished upon his death in 1843.

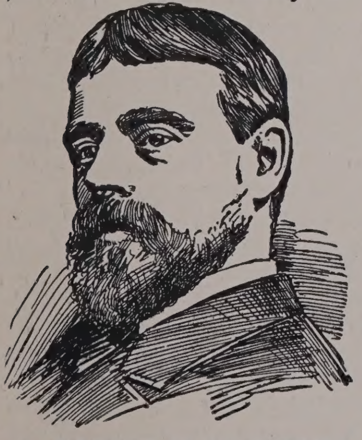
Alluvium (*ȧ-lū′vĭ-ŭm*), masses of sand, earth and gravel brought down by currents of water and spread over plains, forming what is called alluvial land. Thus the Ganges, the Nile, the Amazon and the Mississippi have formed their deltas. It is estimated that the Mississippi every year carries down enough sediment to cover 268 square miles of land with a layer of earth one foot deep. The so-called bottom lands are those formed by alluvial deposits. Along rivers alluvium is sometimes formed into terraces by the rising of floods to different heights.

Alma (*äl′mȧ*), a small river in the Crimea. Here was fought an important battle in the

Crimean War, between the Russians (36,000 men and 122 guns), and the English, French and Turks (62,000 men and 128 guns). The Russians, though intrenched, were defeated, and the road to Sebastopol was opened.

Almagro, Diego D' (*äl-mä′grō, dē-ā′gō*) (born 1464, died 1538), one of Pizarro's officers during the conquest of Peru. He was named from the Spanish town where he was picked up as a foundling. In Peru he became famous and wealthy, though he could neither read nor write. After Peru had been conquered, he began the conquest of Chile, but, recalled by a Peruvian rebellion, subdued it and captured Cuzco. He quarreled with Pizarro, was attacked, defeated and imprisoned by him, and put to death by his order.

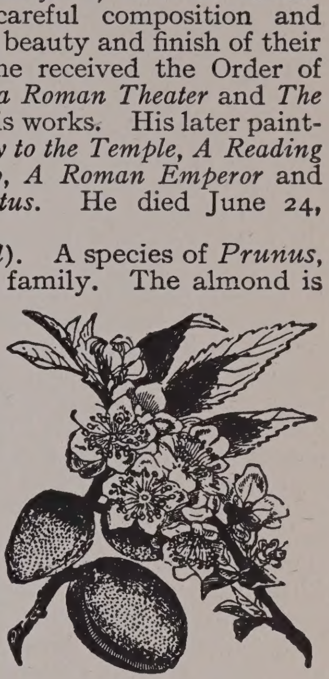
Almanacs (*al′mȧ-năks*), or books in which information is given about the seasons, the sun and moon, eclipses and other phenomena of astronomy, are at least as old as the fifth century after Christ, when they were in use in Alexandria. They may be much older, and of Asiatic origin. With the invention of printing they became common in Europe. They generally contained predictions, the most famous of which was one that happened to be correct, in which Nostradamus foretold the death of Henry II of France. In America the best known almanac was that of Franklin, called *Poor Richard's*, and begun in 1732. Until 1828, when the Society for the Diffusion of Useful Knowledge issued a valuable English almanac, most of those which were sold were either useless for practical purposes or else full of coarse and superstitious remarks. Since that date, however, almanacs have either been published for their practical utility or else for advertisement. In the former class may be mentioned firstly the *Nautical Almanac*, published by the British Government since 1767, which is quite necessary to navigators; secondly, the French *Connaissance des Temps;* thirdly, the German *Astronomisches Jahrbuch;* and finally the United States *American Ephemeris* and *Nautical Almanac.* Very good almanacs are published yearly by some of the great American newspapers; such as the *World* and the *Tribune;* and in these may often be found the exact date of events which are remote enough to be forgotten, but too recent to be readily found in books of reference.



LAWRENCE ALMA-TADEMA

Alma-Tadema (*äl′mä-täd′ā-mȧ*), **Sir Lawrence** a distinguished British artist, was born at Dronryp, in the Netherlands, January 8, 1836. He settled in England in 1873 where he was given knighthood and made a Royal Academician. His paintings chiefly deal with classical subjects, and are distinguished for their careful composition and accuracy and for the beauty and finish of their coloring. In 1905 he received the Order of Merit. *Entrance to a Roman Theater* and *The Vintage*, are two of his works. His later paintings include *The Way to the Temple, A Reading from Homer, Sappho, A Roman Emperor* and *The Triumph of Titus.* He died June 24, 1912.

Al′mond (*ȧ-mŭnd*). A species of *Prunus*, a genus of the rose family. The almond is very old in cultivation, and is probably a native of the Mediterranean region. The two races of almonds are known as the "bitter" and the "sweet," the kernel of the former being used in the manufacture of flavoring extracts and of prussic acid. The sweet almonds, with their edible kernels, are grouped under two heads: those with hard shells and those with soft shells. The almond of commerce belongs to the soft-shelled group, and those with the thinnest shells are known as "paper shells." The commercial cultivation of the almond in the United States is confined to the west, chiefly California. A large part of the almonds used in this country comes from Italy, France and Spain. A native almond is found in southern California, a low bushy shrub with a small, smooth nut Both the almond and the dwarf almond of southern Russia are used as ornamental trees, planted in places not favorable for the production of the nut.



ALMOND

Alpaca (*al-pak′a*), an animal native to the lofty tablelands and mountains of the Andes in Peru. It is related to the camels of the old world, and is kept as a beast of burden by the Peruvian Indians. The wool is of fine quality, usually pale brown in color; but gray and even black varieties are common. The wool grows about eight inches long, when shorn regularly every year, but grows longer when not clipped. As soon as the animal is shorn its resemblance to a small camel without a hump is evident.

Alpena, Mich., county seat of Alpena County, situated at the head of Thunder Bay, Lake Huron, about half-way between Saginaw Bay and the Straits of Mackinac. It has a commodious harbor and extensive shipping facilities by boat, and two railroads. The city has a variety of industries such as paper from wood pulp, excelsior and veneer mills, woolen and knitting works, iron foundries, tanneries, and flour mills. It has two of the largest limestone quarries and cement factories in the United States. It has many public and parochial schools and churches and a public library. In 1930 the population was 12,166.

Alps, the largest and highest mountains in Europe. They are divided into three divisions, the Western, Central and Eastern Alps. The average height of the central chain is 7,700 feet, a region where snow never melts, while several hundred peaks rise still higher. From these snow-capped mountains the avalanches rush down sweeping along snow, rocks, forests and even villages. Here, also, in the valleys between the peaks, gather the huge masses of snow which form the long streams of ice called glaciers (see GLACIERS). The most beautiful of these glaciers is the Mer de Glace. The highest peak is Mt. Blanc, 15,718 feet in height, although Monte Rosa, the Matterhorn and several others are almost as high. There are some sixteen great passes over the Alps. Famous marches have been made over them by large armies. Hannibal's march was through the Little St. Bernard Pass and Napoleon's through the Great St. Bernard. Bridges, terraces and long galleries have been built of stone to give protection against avalanches and whirlwinds. The Alps are now pierced by four railroad tunnels, the Arlberg, Mt. Cenis, Mt. St. Gothard and Simplon. The scenery of the Alps is famous for its grandeur, and every season the mountains are so crowded with tourists that the Alps have been called "the play-ground of Europe." Austria, Switzerland, Italy, France and Germany share in the possession of the Alps.

Alsace-Lorraine (*ăl-sĕs′lō-rān′*), although commonly regarded as a single territory, Alsace and Lorraine are really two regions distinct in geography and history. Alsace lies in the Rhine trough between the Vosges on the west and the Black Forest on the east. German is the prevailing tongue in this region. Lorraine is a part of the old French province of the same name. It is separated from Alsace by the Vosges Mountains. Lorraine has been French in language and spirit since the twelfth century. In 1871 Alsace-Lorraine was annexed to Germany. In 1919, however, by the Treaty of Versailles, it was returned to France. To-day Alsace-Lorraine comprises the Departments of Bas-Rhin, Haut Rhin, and Moselle in France. It covers an area of 5,605 square miles.

Alsace-Lorraine has rich potash fields which were discovered in 1904. In 1932, under French supervision, the output totalled 330,000 metric tons. It has been estimated that the potash beds contain 1,800,000,000 tons of crude salts and 300,000,000 tons of pure potash. Such a supply would last for seven centuries.

Lorraine is especially rich in iron ore. In 1932. 1,349,000 metric tons of pig iron were produced. The steel yield for that year amounted to 1,463,000 metric tons. Coal and salt are also produced here in large quantities.

The most important city in Alsace-Lorraine is Strasbourg, the capital of the Department of Bas-Rhin. Its principal manufactures are beer, leather goods, tobacco and chemicals. In 1931 Strasbourg had a population of 181,465. Other important cities are Metz, Colman and Mulhouse. The population of Alsace-Lorraine in 1931 was 1,898,376.

See SAAR BASIN.

Altai (*äl-tī′*) **Mountains,** a group of mountains in Central Asia separating the tablelands of Mongolia from Siberia. The great Siberian rivers, the Obi, the Irtish and Yenisei, have their sources in these mountains. The highest peaks are over 12,000 feet above sea level.

Alternation of Generations. In all plant groups above the *Thallophytes,* the life history of every plant is made up of two phases. One phase bears the sex organs, and is called the gametophyte; the other bears no sex organs, but produces asexual spores, and is called the sporophyte. These two phases or generations regularly alternate with each other, the gametophyte by means of its sex organs producing the sporophyte, and the sporophyte by means of its asexual spores producing the gametophyte. For example, in the mosses the ordinary leafy plant is the gametophyte, and the so-called fruit is the sporophyte. In the ferns the leafy plant is the sporophyte, while the gametophyte is a very small but independent body, which is never observed except by those who know of its presence. In the flowering plants the whole visible body is the sporophyte; while the gametophyte is so minute that it is effectually concealed from ordinary observation.

See GAMETOPHYTE; SPOROPHYTE.

Alton, a thriving city, and railroad center in Madison County, Illinois. It is situated on the Mississippi, twenty-five miles above St. Louis and about fourteen miles above the mouth of the Missouri River. It is built on high limestone bluffs. The Mississippi is here bridged by the Burlington railroad. An electric railway connects Alton with St. Louis and with Upper Alton, the seat of the Baptist Shurtleff College. The town has a Roman Catholic cathedral, many other churches and schools and a number of important manufactories, including wooden and glass ware, miner tools, mine cars, flour, and agricultural implements. In 1930 the population was 30,151.

Altoona (*ăl-to͞o′nȧ*), a city in Blair county, Pennsylvania. It is situated at the eastern base of the Allegheny Mountains on the Pennsylvania Railroad about 120 miles east of Pittsburgh. The city is surrounded by a rich coal and agricultural region and country famous for its scenic beauty.

Altoona was founded in 1849 by the Pennsylvania Railroad Company which established its workshops here. The company later moved its laboratories and offices to Altoona. To-day it is the home of the largest railway shops in the world. Silk and glass works are also situated here. Altoona is the termius of a division of the main line of the Pennsylvania railroad, and passengers have the convenience of 82 daily trains. Branch roads extend south and southeast. Population, 70,000.

In the summer of 1858, the Altoona Mechanics' Library and Reading Room Association was organized. The high school has a four years' course of study, divided into four courses, namely, vocational, commercial, general and industrial. The Pennsylvania Railroad company has donated to this school one of the most complete equipments for wood working, forge, foundry and metal machinery to be found in the country, and the High School building was erected at a cost of half a million dollars. The parochial schools have a large enrollment. The emphasis on vocational education in Altoona and the skill with which the system has been developed and applied will make the reading of the *School System at Gary* of particular interest and value in this connection.

Alum, common alum, a sulphate of potassium and aluminum, is a salt used in the arts and in medicine. It forms colorless, octahedral crystals containing much water. It is sometimes found in a natural state, but is usually manufactured. There are several kinds of alum, and the one containing ammonium in place of potassium is often used instead of the more common compound. Alum is used in the manufacture of calico, in tanning and dyeing, Mixed in the milk it helps in the separation of the butter, and bakers sometimes use it to whiten their bread. If added in small quantities to turbid water, in a few minutes it will make it perfectly clear without any bad taste or quality, but it should be used with caution in articles of food and drink on account of its astringent properties.

Alu'minum or Alumin'ium, a white metal like tin in appearance. It is the most abundant of the metals, being found in clay, marl, feldspar, slate, mica and many other minerals, but it cannot be cheaply manufactured although great improvement has been made in this direction. (See METALLURGY.) It may be rolled into very thin foil and drawn into very fine wire, and when rolled it becomes harder. When struck it gives forth a very musical sound, and hence is sometimes used for making bells. It is a light metal of about the weight of porcelain, and for many purposes is more convenient than silver. It makes useful alloys; with copper it makes an alloy resembling fine brass, called aluminum-bronze. This alloy is used in cheap jewelry and is adapted for gun metal. It also forms a very useful alloy with silver. It is now used for cooking utensils and a wide variety of other products.

Alva (*ăl'vä*), **Duke of,** a Spanish general, was born in 1508. When a mere boy he gained distinction at the battle of Pavia, and at the age of 29 defended the town of Perpignan against the dauphin of France. He soon rose to be commander of the Spanish army. In 1567, at the head of 10,000 men, he marched into the Netherlands with unlimited powers from Philip II of Spain to proceed against the heretics there. The Court of Blood, which he established here, soon became widely known and feared, and Alva boasted that he had sent 18,000 men to execution. But this great cruelty led to the revolt, which afterward made the Low Countries independent. Alva was recalled to Spain, soon after imprisoned, and, though set free when a skillful general was needed to lead an army against Portugal, he never regained the confidence of Philip. He was able, cruel and proud. His pride is shown by his reply to Philip's demand for an account of the treasure he had captured at Lisbon. "If the king asks me for an account," said Alva, "I will make him a statement of kingdoms preserved or conquered, of signal victories, of successful sieges and of sixty years' service." Nothing more was said about the account. He died in 1582.

Amade'us, a name very common in the ruling family of Savoy. Those of the name most famous were: AMADEUS V, Count of Savoy (born 1249, died 1323), called the Great. His most celebrated exploit was his repulse of the Turks from the Island of Rhodes, then held by the Knights of St. John. In memory of this victory, a Maltese cross, with the letters F. E. R. T. (*Fortitudo ejus Rhodum tenuit*—"His bravery saved Rhodes,"), was made the coat of arms of the family. AMADEUS VIII, count and first duke of Savoy, was born 1383, and died 1451. After a few years of rule, he retired to a monastery, Ripaille, where he lived a life of luxury. In 1439, he was elected to succeed Pope Eugenius IV, who had been deposed, but after a few years he resigned in favor of Nicholas V. As pope, he was called Felix V.

Am'adis of Gaul, the mythical hero of one of the early romances of chivalry; a model knight-errant, of whom Don Quixote is the caricature. The romance was written by a Portuguese courtier, Vasco de Lobeira (who died in 1403), and has been translated into various languages. Amadis, the son of a king of Gaul, had a number of adventures in a great many countries, and crowned his exploits by marrying Oriana, daughter of Lisuarte, an early king of England. The period of the story is about the beginning of the Christian era.

Amagat, Emile Hilaire, a distinguished French physicist, born at St. Satur in 1841. He has enormously extended our knowledge of fluids, especially concerning the compressibility of gases at high pressures. This work was done while he held the chair of physics in the *Faculté Libre des Sciences* at Lyons

Since 1891 has held an official position in the *École Polytechnique* at Paris.

Amal'gam, an alloy of metals, one of which is mercury. Mercury has the power of dissolving almost all other metals and mixing with them, and so is much used in separating gold and silver from their ores. (See METALLURGY.) Amalgams are very numerous, and many of them are used largely in the arts. Tin amalgam is used for silvering mirrors; gold and silver amalgam in gilding and resilvering; cadmium and copper amalgam in dentistry; and zinc and tin amalgam for the rubbers of electrical machines. Amalgams are variously made; some by merely rubbing together the two metals, others by the aid of an electric current. Some amalgams are solid, while others are liquid. The mercury can be distilled off from most amalgams by heating them in retorts. This is the way in which gold and silver are recovered from their amalgams.

Am'aranth (meaning unfading), a class of plants of which the flowers are composed of dry, colored scales and which retain their colors for a long time after they are plucked. Because of this fact the flowers are made emblems of immortality, and are frequently so used in poetry. The cockscomb, prince's feather, love-lies-bleeding and globe amaranth are common kinds of this plant.

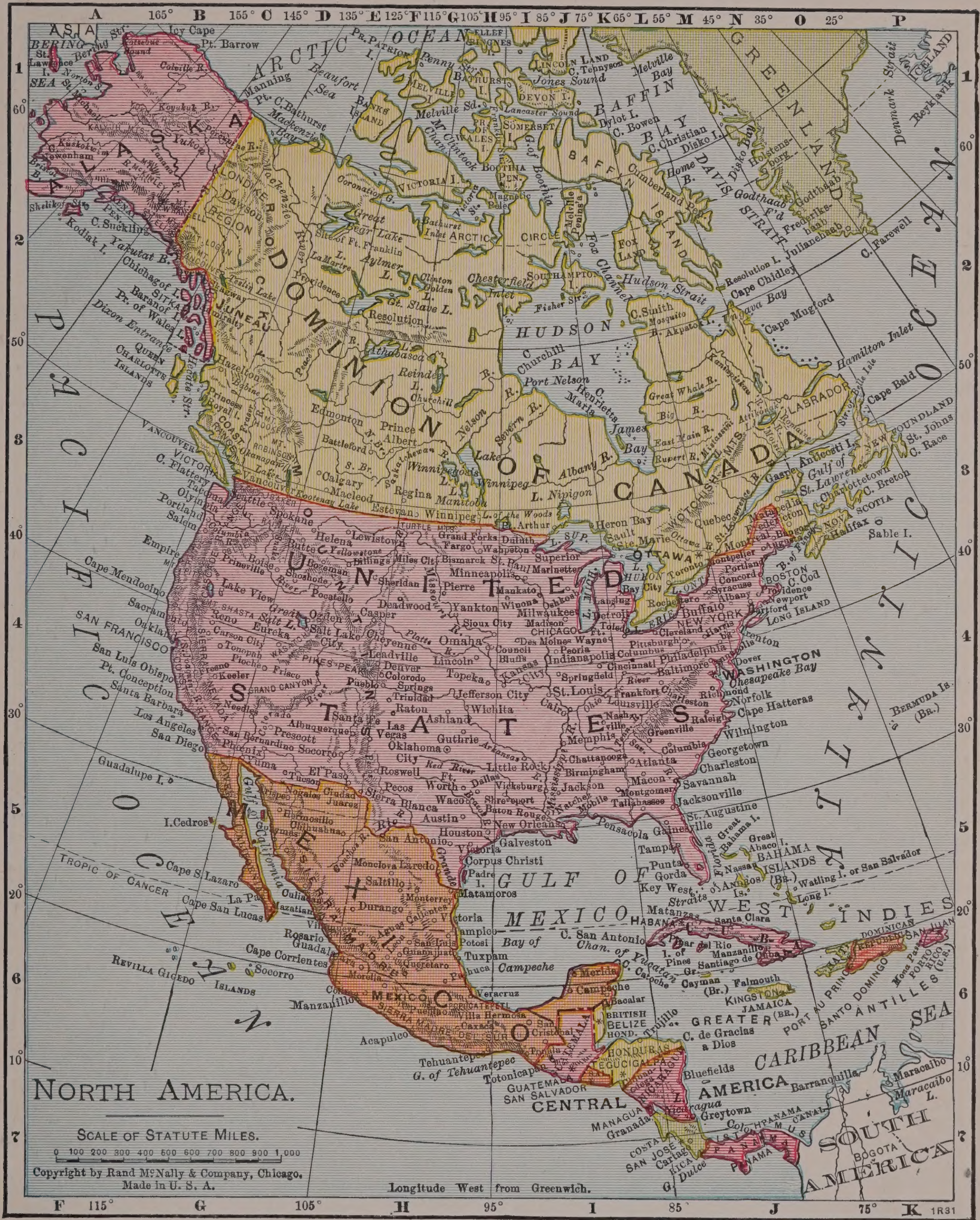
Amarillo (*ăm'ȧ-rĭl'ō*), a city, county seat of Potter County, Texas, 337 miles northwest of Ft. Worth and 275 miles west of Oklahoma City. It is 3600 feet above sea level, and enjoys a clear bracing air and a salubrious climate. It is the most important city of the Panhandle country, which in former years was devoted to grazing, but now wherever cultivated yields profitable crops. It has produced Indian corn, sorghum, maize, wheat, oats, rye, besides vegetables, melons, fruit and in the southern portion cotton. Amarilllo has a good county court house and jail, a handsome city hall, two opera houses and an Elks' Lodge, besides several fine churches and good schools. It has three ice factories, marble, concrete-block, broom and candy factories, a flouring mill, grain elevator, brick works, etc. The city has four banks, water works, electric light, street cars and all adjuncts of a modern city. It is served by the Santa Fe, the Fort Worth and Denver and the Rock Island Railroad. The Santa Fe has yards and shops here; the Denver and the Rock Island each have offices and round houses. Population, 19,124.

Am'azon, a river of South America, flowing easterly from the Andes to the Atlantic, where it empties below the equator. It is the largest river on the globe, but not the longest. Its length is estimated at from 3,000 to 4,000 miles; its width, at its mouth, is 60 miles; it is four miles wide 1,000 miles from the sea; and more than a mile wide 2,000 miles from the sea. Its depth for 750 miles is nowhere less than 175 feet. Over 350 branches and lesser tributaries form its main trunk, and the whole system drains an area of 2,500,000 square miles, or more than a third part of South America. While large vessels can sail from the sea over the main river and its branches, the volume of water is perceptible in the ocean 200 miles from the coast, and the influence of the tides is felt 400 miles from its mouth. The forests are very extensive, being so twisted and matted and interlaced with trees, vines and shrubs, as to present an almost impassable barrier. This "sea of verdure," a traveler says, "extends in an unbroken, evergreen circle of 1,100 miles in diameter." The mouth of the Amazon was discovered by Pinzon in 1500. It was not ascended until forty years later. It is navigable for over 2,000 miles, and with its branches it affords 16,000 miles of navigable waters.

Am'azons, in Greek legend, a war-like race of women living in Asia Minor near the shore of the Black Sea. The mythical town of Themiscyra, on the river Thermodon, was the capital of their state. Their name probably came from a Greek word, meaning breastless, and referred to their habit of cutting off the right breast to give them greater freedom in the use of the bow. The Greeks told a number of stories of their contests with these women. The heroes, Bellerophon and Hercules, defeated them, and Theseus of Athens captured their princess Antiope. In revenge they invaded Attica and were defeated. They also fought in the Trojan War against the Greeks, and Achilles engaged in single combat and slew their queen, Penthesilea. They are represented in Greek sculpture armed with a bow, spear and axe, and carrying a half-shield.

Ambas'sador, an accredited diplomat of note and eminence sent by one nation, country or state to represent his country at a foreign court, nation or capital, and be the chief medium of diplomatic intercourse between them. In this high representative capacity the ambassador has right of audience with the sovereign or chief of the nation to which he is accredited, besides possessing or being accorded certain other privileges and immunities, including precedence on ceremonial occasions and at state functions over all save princes of the blood.

In its early history, the United States withheld for long the rank and title of ambassador to its accredited representatives abroad at foreign courts; but in 1893 Congress, when acting on the diplomatic or consular appropriation bill of that year, empowered the President to raise American plenipotentiaries and ministers at foreign courts and capitals of note to the rank of ambassadors, especially where these foreign courts and nations were represented at Washington by a plenipotentiary of equal



NORTH AMERICA.

SCALE OF STATUTE MILES.

0 100 200 300 400 500 600 700 800 900 1,000
ALASKA
DOMINION OF CANADA
UNITED STATES
MEXICO
CENTRAL AMERICA
GREENLAND
ICELAND
SOUTH AMERICA
ASIA
ARCTIC OCEAN
PACIFIC OCEAN
ATLANTIC OCEAN
HUDSON BAY
BAFFIN BAY
GULF OF MEXICO
CARIBBEAN SEA
WEST INDIES
GREATER ANTILLES
BAHAMA ISLANDS
TROPIC OF CANCER
WASHINGTON
OTTAWA
MEXICO
Longitude West from Greenwich.
1R31

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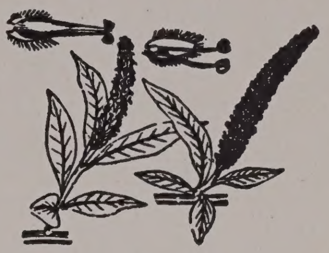
rank. This was done, and the rule and practice are still in force.

Am'ber is a hard, brittle, yellow substance. It is found in large and small pieces; the largest are in the museum at Berlin, weighing eighteen pounds. It is found mostly clinging to seaweed along the shores of the Baltic Sea, where divers dive for it and dredgers throw it up on the shore for women and children to gather and pick over. Some is found in New Jersey, Massachusetts and Maryland. When amber is rubbed, it develops electricity, and attracts light substances. This quality very much astonished the ancients, and they gave it the name "electron," from which we have the word "electricity." It is used mostly for beads, ornaments and mouthpieces for tobacco pipes, though large amber dishes have been found, showing that people long ago used it for manufacturing. The ancients valued amber highly, both as ornament and charm, amber necklaces being worn in the belief that the wearer would thereby be protected from witches, poisons and other evil.

Ambrose, Saint, one of the most prominent of the bishops of the early Christian church. He was born in Gaul about 340 A. D., and was educated for the profession of law. He was appointed prefect of Liguria and Æmilia, and chose Milan as his residence. When the bishop of Milan died in 374, there was a great struggle between the orthodox and the Arian Christians in regard to the succession. Finally, Ambrose was unanimously elected, although he was not a priest. He accepted the office reluctantly, disposed of his property, and at once devoted himself to those studies which would prepare him for his office. His life was one of struggle as he opposed those in Rome, who wished to restore the worship of heathen gods, also the Arian sect which denied the divinity of Christ; and he even went on embassies to the northern tribes, which were planning to attack Italy. When the emperor, Theodosius, ordered the massacre of the Thessalonians in 390, Ambrose compelled him to perform penance for eight months, and exacted the promise that thereafter a period of thirty days should intervene before any sentence of death was executed. Ambrose left a large number of writings whose object was to defend and extend the Christian religion. It was through his preaching that Augustine was converted. He was the author of a kind of singing called the Ambrosian chant. He died in 397.

Am'bulance, a name applied to the covered wagons used in our large cities to convey the wounded and sick to the hospitals. Strictly, it means a movable hospital attached to an army in the field, to afford early help to the wounded in battle. It was introduced by the surgeon Larrey, into the French army in 1792. Before that, wounded soldiers were either carried to the rear by their comrades, or left uncared for, sometimes until a day after the battle. The usual working of an ambulance during a battle is as follows: The field station is usually just in rear of the troops, and therefore under fire; the wounded are there treated hastily, then carried on stretchers to the transfer station, which is out of rifle range. Here they are put into ambulance wagons and driven to the dressing station, out of artillery range, where the wounds are dressed, and the sufferers are finally taken to the field-hospital.



AMENTUM
(Willow. male and female, with separate flowers.)

Am'ent. The characteristic flower cluster of birches, alders, willows, etc. See INFLORESCENCE.

America (*a-mer'ĭ-ka*). One of the five continents of the globe, has an area of 16,000,000 square miles, and is larger than Europe and Africa together. Its extreme length from the northern limit of Alaska to the south end of Patagonia is 8,700 miles, or, including the Arctic Islands on the north and Tierra del Fuego on the south, 9,600 miles. Its greatest width is over 3,000 miles. The isthmus of Panama, but twenty-eight miles wide at its narrowest point, separates the continent into North America and South America, and each of these is known as a continent.

These two continents are similar in physical characteristics. Each is a triangle, broadest at the north, and the trend of the western coast of each is directly southeast. Each has a vast mountain range on the western coast, a lower and less continuous range in the eastern section, with a wide central region of plains. Each is drained by three great river systems.

NORTH AMERICA is larger than South America, having an area of 8,700,000 square miles. On the northeast is Hudson Bay, and on the eastern coast are the Gulf of Saint Lawrence, the Bay of Fundy, Delaware and Chesapeake Bays, the Gulf of Mexico and the Gulf of Honduras, with other smaller indentations, affording ample and safe harbors. The western coast has few inlets, the most important being San Francisco Bay, Puget Sound and the Gulf of California.

Surface and Drainage. On the western side is the great Rocky Mountain range, running the whole length of the continent. Besides the main Rocky Mountain range, called Sierra Madre in Mexico, are parallel ridges, the Coast, Sierra Nevada and Cascade ranges. This vast system of mountain ranges and high plateaus has an extreme breadth of 1,000 miles. Between the main range and the Sierra Nevadas, lies a high table land called the Great Basin, which includes Utah, Nevada and parts of Arizona and New Mexico. The highest peaks are, in Alaska, Mount McKinley, 20,464 feet, Mount Saint Elias, 18,024 feet, Mount Wrangell, 17,524 feet; in the Sierra Nevada range, Mount Whitney, 14,898 feet; in the Cascade range, Mount Shasta 14,510 feet, Mount Rainer or Tacoma, 14,526 feet; in Mexico, Orizaba, 18,250 feet, and Popocatapetl, 17,520 feet.

On the east coast is the Appalachian range, which is lower than the Rockies and runs parallel to the Atlantic, but further from the coast line. Appearing first in the Wotcish ridge of Labrador, it extends to the table lands of Alabama. The White Mountains, Adirondacks, Allegheny and Blue Ridge Ranges belong to this system. Mount Mitchell in North Carolina, 6,688 feet, and Mount Washington, in New Hampshire, 6,293 feet, are the highest peaks.

Between these two mountain systems is the great central plain, stretching from the Arctic Sea to the Gulf of Mexico. The eastern and southern portions of this great plain are, or originally were, heavily timbered. The central portion on both sides of the Mississippi and stretching west to the higher planes of the Rocky Mountain system is the great prairie country, level or slightly rolling, nearly treeless, with a deep and wonderfully fertile soil. East of the Appalachian range is a region of hills and valleys, known as the Piedmont region, sloping down to a wide coastal plain, with low, swampy lands on some portions of the coast. On the Pacific Coast is a narrower but rich and productive region, rising to the western slopes of the mountains, and running through California, Oregon and Washington up into British Columbia.

The southern end of the continent through Mexico is chiefly a great tableland, reaching an elevation of 8,000 feet, dropping abruptly on the east to the Gulf of Mexico, and sloping more gradually to the Pacific. A low level is reached at the Isthmus of Tehuantepec. The greater part of Central America, including Guatemala, Honduras, Salvador and northern Nicaragua, is mountainous, sinking in southern Nicaragua to 100 feet above sea level, where is Lake Nicaragua.

Animal and Vegetable Life. The animals of North America possess hardly a feature in common with those of South America. In many respects they stand closely related to those of northern Asia. Among distinctly North American animals are the alligator, bison or buffalo, beaver, Eskimo dog, grizzly bear, moose, muskox, puma or panther, rattlesnake, reindeer and white mountain-goat. There are also black, brown and polar bears, deer, the wolf, fox, raccoon, opossum, prairie dog, otter, marten, lynx badger, and many other animals which are similar to those of Europe and Asia.

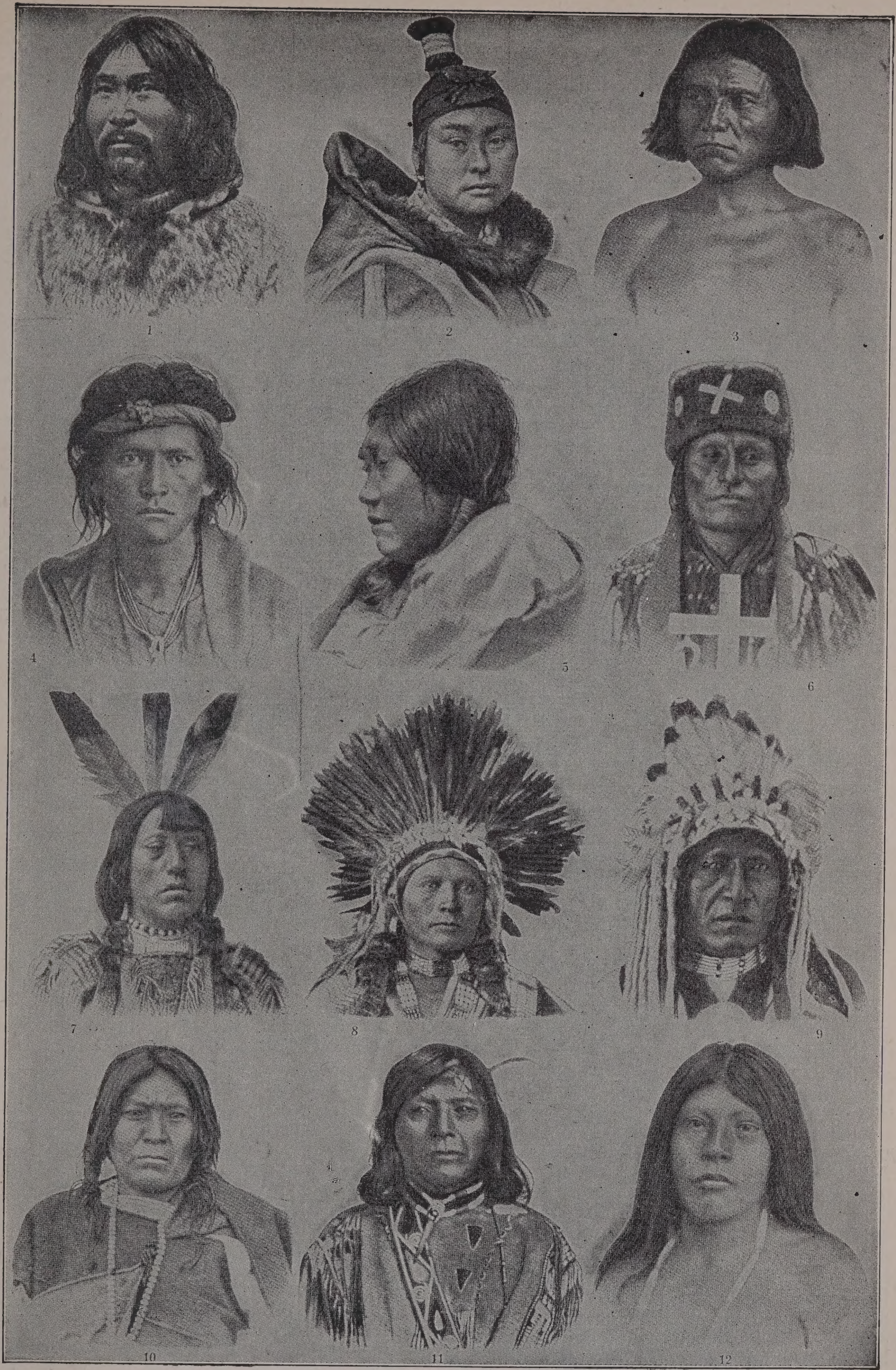
Of birds and wild fowl more than 2,000 varieties have been catalogued. Among the larger kinds are the eagle, vulture, turkey buzzard, hawk, crow, wild turkey, the heron, the flamingo, the wild goose, the crane and the pelican.

Specific trees include the boxwood, cypress, hickory, magnolia, mahogany, palmetto, pecan, redwood, sequoia. There are also vast forests of pine, spruce, fir, hemlock, cedar, as well as oak, ash, maple and many other varieties of hard wood. Of plants and vegetables, cotton, cactus, maize, orchids, peppers, pineapples, plantains, potatoes, sugar cane and yams are natives of America, and here are the great grain fields of the world.

Climate. Stretching as it does from the arctic to the tropical zone, North America presents every variety of climate. In the extreme north the ground remains frozen through the year, the short summer sufficing to warm the surface and produce a meager vegetation. The temperate region is subject to wide ranges of temperature, giving four seasons, a frigid winter, mild spring and autumn and a hot summer, while the southern portion presents the usual characteristics of the tropics. Moreover, the temperature on the Atlantic coast and the interior is more variable than on the Pacific coast, where the climate is modified and made equable by the warm winds from the Pacific. The climate of the western coast is more like that of the western coast of Europe.

The rainfall is heaviest on the Gulf coast and lower Mississippi Valley, where the south winds bring in the moisture-laden air from the Gulf; and on the more Northern Pacific coast, where the prevailing winds are from the ocean. On the Atlantic and westward to the upper Mississippi Valley and north of the great lakes, the rainfall is ample for vegetation, while east of the Rocky Mountains, remote from the Gulf, and on the lower Pacific coast, there are large semi-arid areas.

Minerals. North America is rich in minerals. Immense deposits of gold, silver and copper are found in the Rocky Mountain range, from Alaska, through Mexico, and rich but less extensive fields in other parts of the continent. North America stands first of the continents in the production of silver, and second and nearly equal to Africa in the production of gold. The United States alone produces more than one third of the world's coal, more than half the world's copper and almost one half the world's iron. Excepting tin, all the important minerals are found in North America in abundance.



NATIVES OF NORTH AMERICA
1 Eskimo of Labrador 2 Eskimo Woman of Greenland 3 Apache 4 Navaho 5 Koskimo Woman, Vancouver
6 Cheyenne 7 Mandan 8 Ute 9 Blackfoot 10 Woman Moki Chief
11 Nez Perce 12 Wichita Woman

Inhabitants. When America was discovered by Europeans it was peopled by a savage race, who were named Indians because the land was then supposed to be a part of India. In the north these were roving tribes, living chiefly by hunting and fishing. In Mexico were found the Aztecs, who had been preceded by the Toltecs, and these were more civilized than the tribes of the north. These people receded before the advance of the white race, and are now few in number and confined to circumscribed limits or reservations. The early emigrants to America were chiefly English, who settled in the United States, French, who entered Canada, and Spanish, who occupied Mexico and Central America. The present population is made up of descendants of these colonists and of later emigrants from every European nation and some from Asia, together with Negroes, who were introduced as slaves.

Divisions. The political divisions of North America are the United States, the Dominion of Canada, Newfoundland, Mexico and the Central American States. Canada occupies almost the whole of the continent north of the great lakes and lat. 49° N. The territory of the United States extends from the British possessions to Mexico and the Gulf of Mexico and from the Atlantic to the Pacific Ocean. Alaska Territory, belonging to the United States, occupies the northwest corner of the continent. The republican form of government prevails everywhere, except in the British dominions. The areas and population are as follows:

	Area, sq. miles	Pop.
British America (including Newfoundland)........	3,729,665	7,319,400
United States (including Alaska)...............	3,617,673	92,036,622
Mexico..................	767,005	15,063,207
Central American States..	207,474	4,803,487
West Indies.............	94,400	6,451,237
	8,416,217	125,673,953

History. The history of America begins in 1492, when Christopher Columbus sighted the West Indies, probably Watling's island, in the Bahamas. We know that 500 years before Columbus there were Norse colonies in Greenland and on the continent further south, which were altogether forgotten at the beginning of the 16th century. The belief that the natives of the continent came from China is gaining some credence, though little definitely is really known. However, it is generally held that the native peoples of both the Americas are of one race. It was named in honor of Amerigo Vespucci, a Florentine, who first sailed for the western hemisphere, in 1499. For the circumstances under which this great honor fell to him, see biographical sketch, page 63.

For modern history of North America, its material development and civic progress, see articles on UNITED STATES, CANADA and MEXICO; also articles on the different states and provinces.

CENTRAL AMERICA. The southern end of North America, lying between Mexico, Colombia, the Caribbean Sea and the Pacific. In geological formation, it differs from North and South America, and appears to belong to a different system, related to the West Indies, the mountain folds having an east and west trend, and apparently having no connection or relation to the Rocky Mountain and Andean systems of North and South America. Its length is 1,280 miles and maximum breadth 315 miles, dwindling to 28 miles at the Isthmus of Panama. The area is 207,474 square miles, and the population about 4,803,487, Panama included.

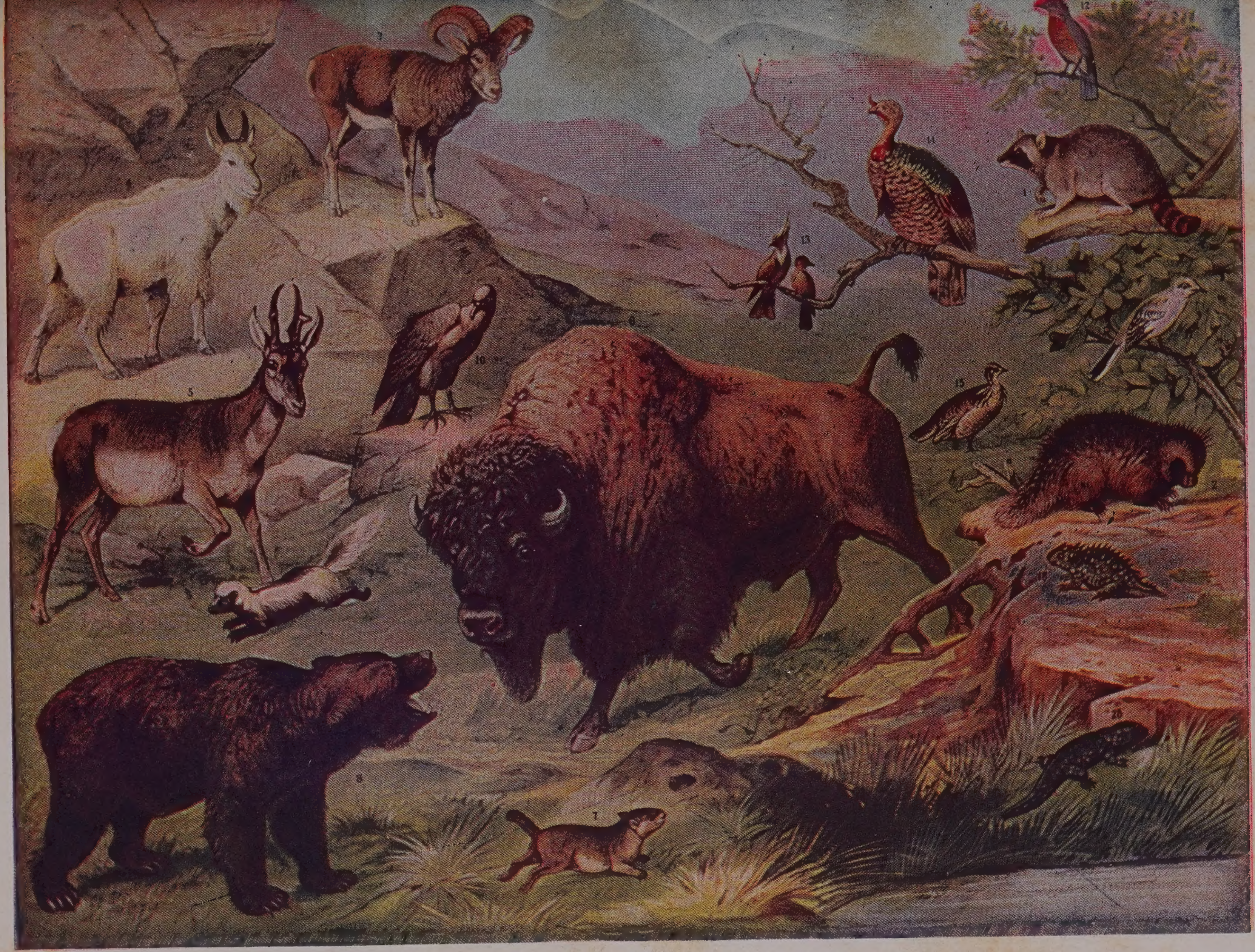
Physical Features. At Tehuantepec, Mex., is a broad plain. In northern Guatemala the mountains begin, close to the Pacific, extending through Salvador, Honduras and Nicaragua. Not of great height, they consist of detached ranges with volcanic peaks, some of which are active. Then comes the depression nearly filled by Lake Nicaragua, the largest inland body of water south of the great lakes. In Costa Rica highlands follow. Panama is a low plateau. The rivers flow mostly into the Gulf and the Caribbean. The climate is tropic and pestilential on the shores and along the streams, but moderate and healthful on the uplands. The rainfall is enormous, 200 inches at Panama, and creates heavy vegetation.

Animal and Vegetable Life. The animals of Central America are those of South America. There are heavy forests which are rich in mahogany and other valuable woods. The chief products are fruits, coffee, rubber, sugar, indigo and tobacco; corn, wheat and rice are grown to some extent. Mineral resources are great, including gold, silver, platinum, copper, lead, iron and zinc.

Inhabitants. Central America was the home of the Aztecs, and is rich in remains of this ancient civilization. The present inhabitants are Creoles or Spanish-speaking whites, Indians, Negroes and mixed races.

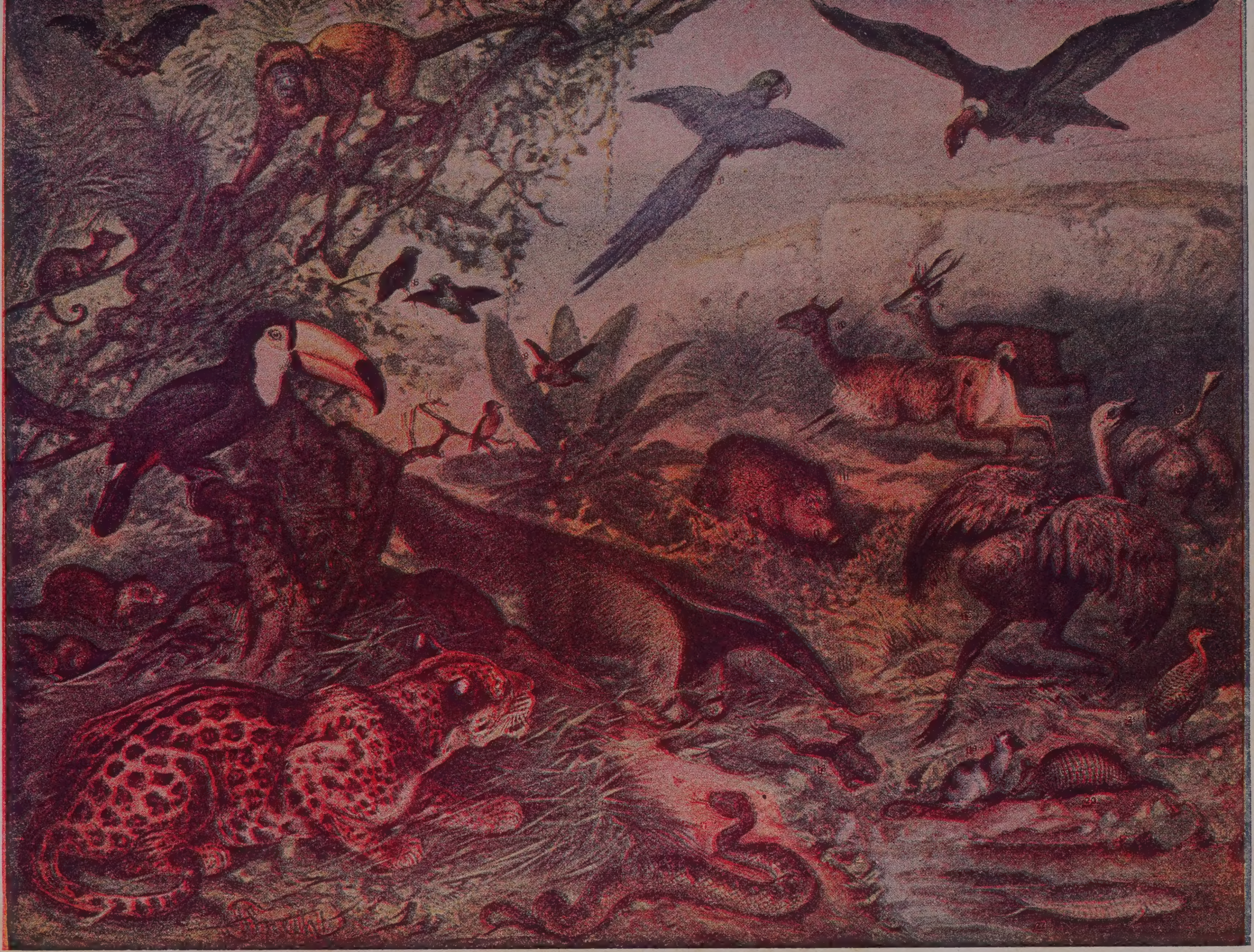
Political Divisions. These include Belize (British Honduras), Costa Rica, Guatemala, Honduras, Nicaragua, Panama and Salvador. Belize is a British possession, the remaining states independent republics.

History. The coast of Central America was visited by Rodrigo de Bastidas in 1500, and by Columbus in 1502. It was invaded by Cortez in 1524. Guatemala and Salvador were held by Alvarado, second in command to Cortez. For three centuries the country was under Spanish rule and subject to frequent disturbances and harsh conditions. Independence was achieved in 1821, and in 1823 a republic was formed by the union of the five provinces. Slavery was abolished in 1824, but after dissensions and



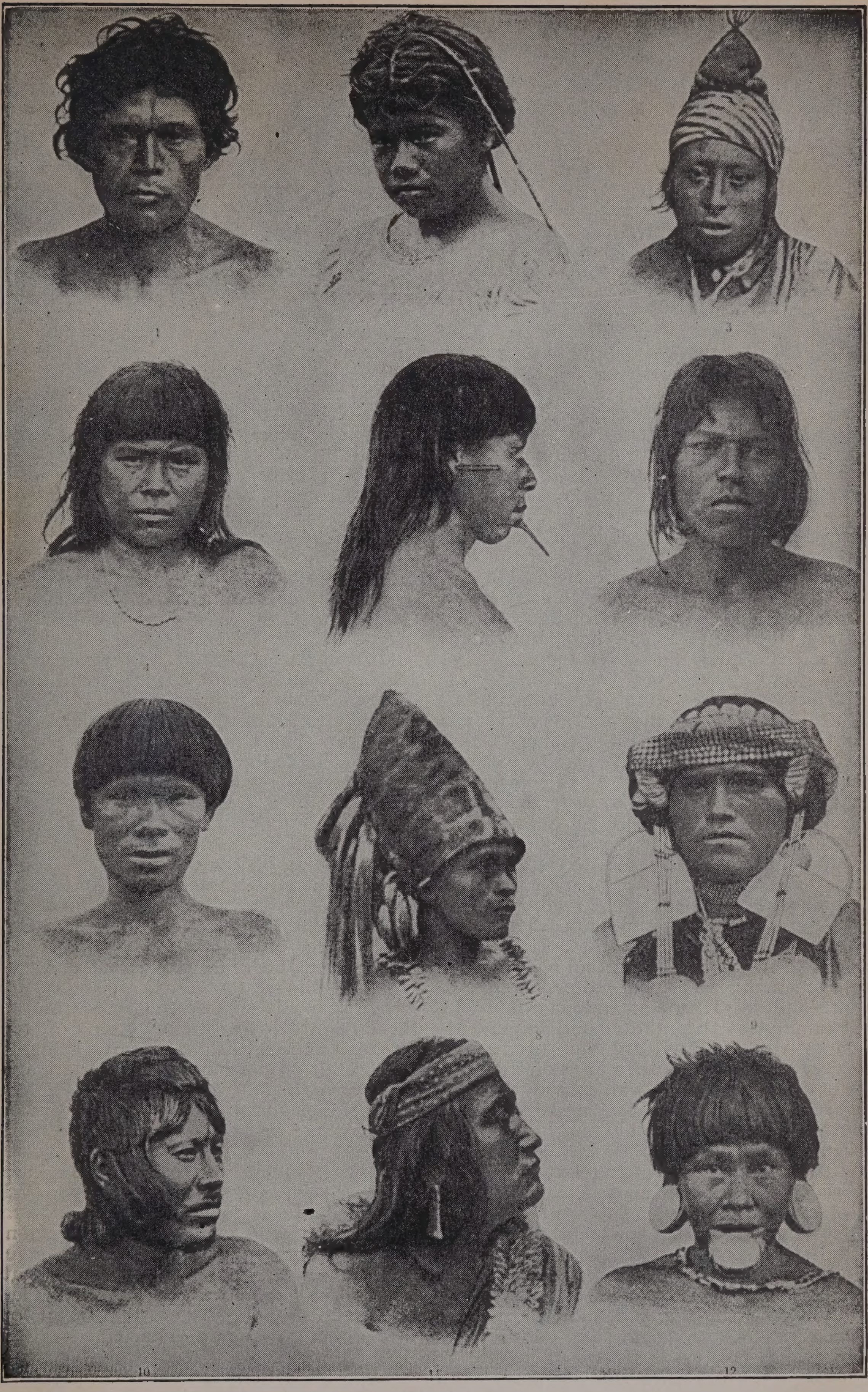
NORTH AMERICAN ANIMALS

1—Raccoon. 2—Porcupine. 3—Rocky Mountain Sheep. 4—Mountain Goat. 5—Antelope. 6—Bison. 7—Prairie Dog. 8—Grizzly Bear. 9—Skunk. 10—Bald Eagle. 11—Mocking Bird. 12—Blue Bird. 13—Kolibri. 14—Wild Turkey. 15—Prairie Chicken. 18—Horned Toad. 20—Axolote, Mexican Salamander.



SOUTH AMERICAN ANIMALS

1—Vampire Bat. 2—Howling Monkey. 3—Aracari. 4—Condor. 5—Opossum. 6—Toucan. 7—Pampas Deer. 8—Tanagers. 9—Tufted Humming Bird.
10—Llama. 11—Peccary. 12—Agouti. 13—Guinea Pig. 14—Ant Bear. 15—Rhea. 16—Jaguar. 17—Diamond Snake. 18—Pitted Frog.
19—Swimming Marsupial. 20—Armadillo 21—Pampas Chicken. 22—Scaly Salamander.



NATIVES OF SOUTH AMERICA

1 Guatuso 2 Talamanoan Woman 3 Bolivian Indian 4 Guaykuru 5 Caraja 6 **Matako**
7 Brazilian Indian 8 Guayaqui 9 Araucanian (Chile) 10 Tierra del Fuegan
11 Patagonian 12 Botocudo Woman

civil war the republic was dissolved in 1838. The progress of the country has since been retarded by frequent wars and revolutions. In 1907 a meeting of delegates from all the states was held in Washington, U. S. A., and an agreement was made that all differences which may occur shall be submitted to a peace-court at Costa Rica.

South America. It is important to remember that South America is southeast of North America. The entire southern continent lies east of Florida, and three-fourths of its western coast lies east of New York. Its easternmost point is nearer to Africa than is its northern coast to New Orleans. Its length is 4,500 miles, greatest breadth 3,200 miles, area 7,300,000 square miles and population about 40,000,000. It is a triangle with its base on the north, and dwindling to a point at Cape Horn on the south. Its coast-line is for the most part unbroken, the important inlets being on the north the Gulf of Venezuela, on the northeast the mouth of the Amazon, on the east the Bay of All Saints, Bay of Rio de Janeiro, the mouth of the Plata, Bahia Blanca, Gulf of San Matias and Bay of San George; on the west line there is no important break in the coast-line, but several small bays which afford harbors.

Surface and Drainage. A commanding physical feature of the continent is the mighty Andean Mountain range which traverses its entire length on the western coast, with a mean height of 12,000 feet, a breadth varying from 40 to over 300 miles, covering more than one million square miles, numbering scores of active volcanoes, and towering at Mt. Aconcagua to 24,000 feet, the highest point on the western hemisphere. In the heart of the continent it divides into two ranges, inclosing the high plateau of Bolivia, the second largest and most elevated table land in the world, with an elevation of 13,000 feet and an area of more than 40,000 square miles. This tremendous mountain wall dominates the rainfall and largely influences the climate and the productive value of almost the entire area of the continent. Lower lateral ranges run through Venezuela and the Guianas, and in eastern Brazil are several parallel ranges with intervening highlands.

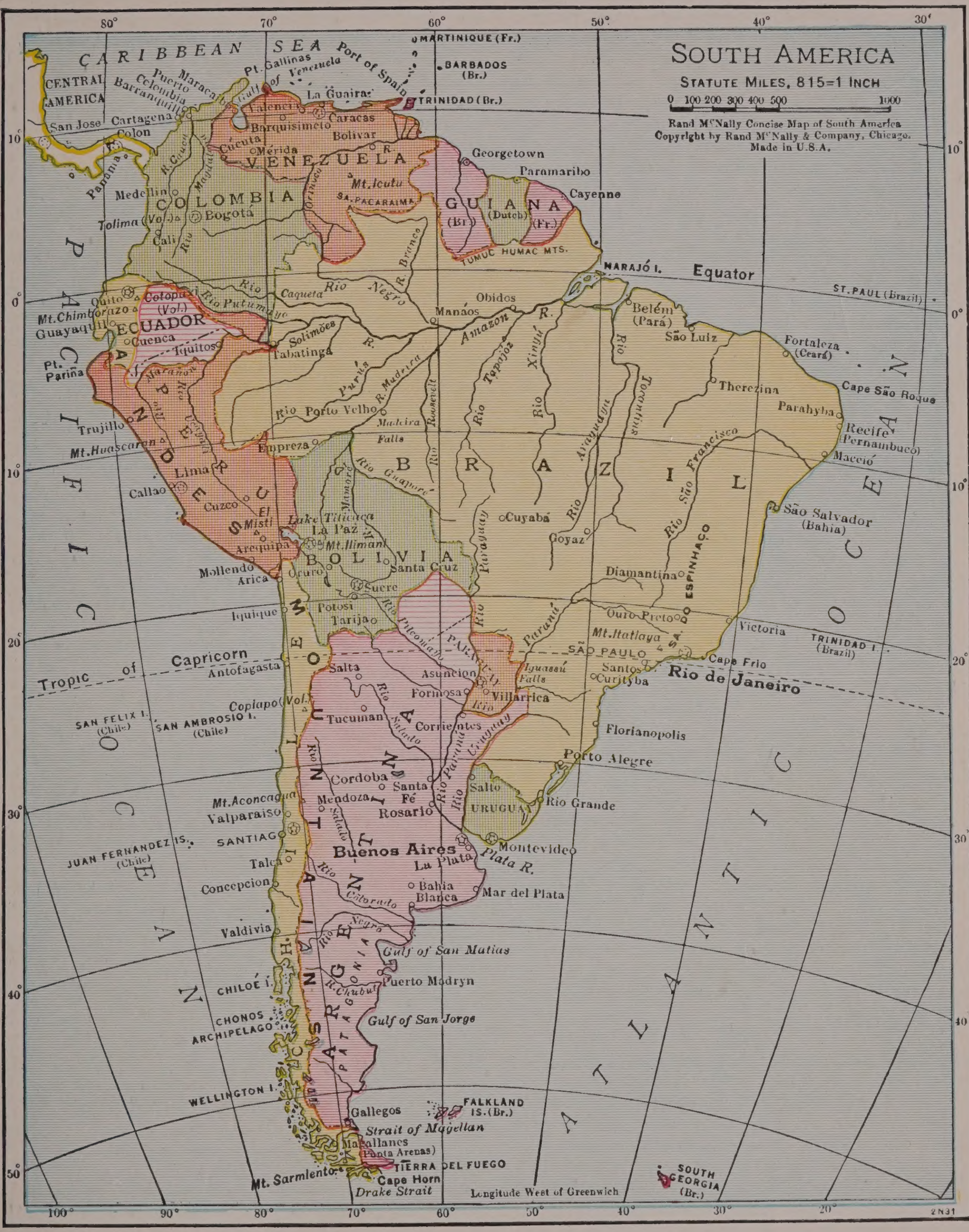
Within these bordering mountain ranges the center of the continent is a vast region of plains and valleys, sloping up to the Andes and stretching down through the rich pampas of Argentina to the gravelly plains of Patagonia.

The continent is drained by three vast river systems, the Amazon, the Orinoco and the Plata. As drainage systems and navigable water-ways they have no parallel, affording over 50,000 miles of navigable waters. The Amazon discharges more water than Asia's eight largest rivers. In its valley of 2,500,000 sq. miles is a vast, almost impenetrable forest. It is connected with the Orinoco indirectly by a sometimes navigable channel. The Plata system, in its northernmost feeders, lies but three miles from southern tributaries of the Amazon, and a canal would provide unbroken inland navigation from the mouth of the Amazon to the mouth of the Plata. Another, around rapids in the Orinoco, would pass boats from Venezuela to Uruguay. These rivers form nature's highroads from the Atlantic to the Andes. The great lake is Titicaca in Bolivia, 12,645 feet above tidewater and about 1,800 miles in area.

Climate and Rainfall. South America experiences less variation in temperature than North America. Three fourths of its area, including the most fertile districts, lie within the tropics, about one fourth in the temperate zone. The tropic regions east of the Andes receive heavy rains in the long wet season, and have high temperatures, but the western coast between Panama and Chile is a burning desert. The Andes on their sunset slopes make climates of their own, differences in altitudes, even in the tropics, creating warm, temperate and frigid zones.

It is important to note that while in North America the heaviest rainfall is on and near the sea coast, in South America it is heaviest in the interior of the continent, remote from the sea. The trade winds carry the warm moisture-laden air inland from the Atlantic, until, cooled by contact with the foot-hills of the Andes, heavy precipitation occurs, and, passing on, the remaining vapor fails in snow on the summits of the range, the winds falling on the western slope cool and dry. Thus the western coast-line north of latitude 30° is practically rainless, there being points where no rain has fallen for many years, while on the eastern slopes of the Andes the rains are tremendous. The rivers of the western coast are small shallow streams, while east of the Andes the rivers become streams of great volume near their source, and furnish commercial highways thousands of miles inland from the sea.

Animal and Vegetable Life. The variations in elevation and rainfall result in a wide range of products. In the tropical valleys, under the influence of heat and moisture, vegetation is riotously luxuriant. Forests, especially in the Amazon valley, are so dense as to be almost impenetrable. A scientist who camped in this region relates that he found it necessary to have the area about his hut cut over at frequent intervals, to escape being enveloped in the rank, upspringing vegetation. The forests are rich in rubber and ornamental woods, including rosewood, satinwood, cedar and mahogany; besides valuable dye-woods. Corn, potatoes and tobacco are indigenous, as are agave, arrowroot, cinchona, cocoa, pineapple and tapioca. The forests teem


SOUTH AMERICA
STATUTE MILES, 815=1 INCH
0 100 200 300 400 500 1000
Rand McNally Concise Map of South America
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CARIBBEAN SEA
CENTRAL AMERICA
San Jose
Colon
Panama
Cartagena
Barranquilla
Puerto Colombia
Maracaibo
Gulf of Venezuela
Pt. Gallinas
Port of Spain
MARTINIQUE (Fr.)
BARBADOS (Br.)
TRINIDAD (Br.)
La Guaira
Valencia
Caracas
Barquisimeto
Bolivar
Cucuta
Mérida
VENEZUELA
R. Orinoco
Mt. Icutu
SA. PACARAIMA
Georgetown
Paramaribo
Cayenne
GUIANA
(Br.)
(Dutch)
(Fr.)
TUMUC HUMAC MTS.
R. Cauca
R. Magdalena
Medellin
COLOMBIA
Bogotá
Tolima (Vol.)
Cali
Rio Caqueta
Rio Putumayo
R. Branco
Rio Negro
MARAJÓ I.
Equator
ST. PAUL (Brazil)
Quito
Cotopaxi (Vol.)
Mt. Chimborazo
Guayaquil
ECUADOR
Cuenca
Iquitos
Pt. Pariña
Marañon
Tabatinga
Solimões R.
Manáos
Obidos
Amazon R.
Belém (Pará)
São Luiz
Fortaleza (Ceará)
Cape São Roque
Therezina
Parahyba
Recife (Pernambuco)
Maceió
Rio Purus
R. Madeira
Rio Porto Velho
Madeira Falls
Rio Roosevelt
Rio Tapajoz
Rio Xingú
Rio Tocantins
Araguaya
Rio São Francisco
Trujillo
Mt. Huascaran
PERU
Rio Ucayali
Lima
Callao
Cuzco
El Misti
Arequipa
Mollendo
Arica
Empreza
Rio Mamoré
Rio Guaporé
Lake Titicaca
La Paz
Mt. Illimani
BOLIVIA
Oruro
Santa Cruz
Sucre
Potosi
Tarija
Iquique
Antofagasta
Copiapo (Vol.)
BRAZIL
Cuyabá
Goyaz
Rio Paraguay
Diamantina
SA. ESPINHAÇO
Ouro Preto
Mt. Itatiaya
São Salvador (Bahia)
Victoria
TRINIDAD I. (Brazil)
Cape Frio
Rio de Janeiro
SÃO PAULO
Santos
Curityba
Iguassú Falls
Paraná
PARAGUAY
Rio Pilcomayo
Asuncion
Villarrica
Formosa
Tropic of Capricorn
Salta
Tucuman
Rio Salado
Corrientes
Rio Uruguay
Florianopolis
Porto Alegre
Cordoba
Santa Fé
Rosario
Rio Paraná
Mendoza
Salto
URUGUAY
Rio Grande
Mt. Aconcagua
Valparaiso
SANTIAGO
Talca
Buenos Aires
La Plata
Plata R.
Montevideo
Concepcion
Bahia Blanca
Rio Colorado
Mar del Plata
Valdivia
Rio Negro
Gulf of San Matias
Puerto Madryn
R. Chubut
Gulf of San Jorge
PATAGONIA
ARGENTINA
ANDES MTS.
CHILE
SAN FELIX I. (Chile)
SAN AMBROSIO I. (Chile)
JUAN FERNANDEZ IS. (Chile)
CHILOÉ I.
CHONOS ARCHIPELAGO
WELLINGTON I.
Gallegos
FALKLAND IS. (Br.)
Strait of Magellan
Magallanes (Punta Arenas)
TIERRA DEL FUEGO
Mt. Sarmiento
Cape Horn
Drake Strait
SOUTH GEORGIA (Br.)
PACIFIC OCEAN
ATLANTIC OCEAN
Longitude West of Greenwich
80° 70° 60° 50° 40° 30°
100° 90° 80° 70° 60° 50° 40° 30° 20°
10° 0° 10° 20° 30° 40° 50°
2N31

with animal life. Four fifths of the mammals and birds are elsewhere unknown. Among them are the jaguar, gigantic boas, blood-sucking bats, the llama, the vicuña, guañaco, the alpaca, the tapir and the condor.

Resources. South America is rich in mineral, forest and agricultural resources, yet none of these have been developed so as to give an adequate measure of their possibilities. Gold and silver are exported from nearly all of the republics. The mines of Peru and Bolivia are famous, and those of Brazil, Chile, Colombia and Guiana are important. Large deposits of iron and diamonds are found in Brazil. (See BRAZIL.) The forests have an inexhaustible store of rubber and valuable woods. Brazil furnishes 65% of the world's coffee and more than half the world's rubber; the wheat of Argentina is a large item in the world's commerce.

Inhabitants. These belong to the white, red and black races, and include hybrid races. The white inhabitants consist in large part of Spanish and Portuguese Creoles, American descendants of European settlers, though the British, Dutch and French are present. Argentina and Brazil have hundreds of thousands of German, Italian and Polish colonists. The red men or Indians are the aborigines, and the ancestors of some of these originated native civilizations. The blacks are the descendants of slaves imported from Africa, but slavery has nominally ceased. Chinese and Hindu coolies are present in considerable numbers.

Political Divisions. South America comprises the republics of Colombia, Ecuador, Venezuela, Peru, Bolivia, Chile, Argentina, Brazil, Paraguay and Uruguay, besides the colonies of British, French and Dutch Guiana and the Falkland Islands (British). The areas and populations are as follows:

	Area, sq. m.	Pop.
Argentina	1,139,979	6,989,023
Bolivia	708,195	2,267,935
Brazil	3,218,130	20,515,000
Chile	291,500	3,500,000
Columbia	438,436	5,072,604
Ecuador	116,000	1,500,000
Paraguay	171,815	800,000
Peru	679,600	4,500,000
Uruguay	72,210	1,042,686
Venezuela	393,976	2,713,703
British Guiana	90,277	296,041
French Guiana	30,500	27,000
Dutch Guiana	46,258	85,094
Falkland Islands	5,300	2,272
	7,402,176	49,311,358

History. The history of the continent falls into two eras—that before and that since Columbus discovered South America (1498). The Peruvian or Inca Indians had advanced far in culture and empire-building, but Pizarro (1531) conquered and destroyed their civilization. The history during the sixteenth century is a record of exploration and invasion. As early as 1550 the contour of the continent was determined, the country penetrated to the core and European power established. Spanish activity included far the greater part of the habitable area, Portuguese colonization confining itself to Brazil. Portugal and Spain for three centuries failed to treat their possessions sagaciously or generously, exploiting the colonists as badly as the natives and the resources. Between 1605 and 1767 the Jesuits civilized the Indians of Paraguay. During 1776-1811 colonial loyalty to Spain was everywhere weakened. In 1810-25 came the heroic age. Bolivar, San Martin and Sucre' freed Buenos Aires, Chile, New Granada (now Colombia), Quito (now Ecuador), Paraguay and Peru, while Brazil became independent peacefully. Monroe, in 1823, enunciated the doctrine that Europe should in no way attempt to control the destiny of South America. During 1825-75 the Spanish Americans suffered greatly, the Brazilians slightly, from civil and foreign wars, but about 1877 an era of progress opened. Our Centennial and Columbian Expositions fostered aspirations for peace and prosperity. Secretary Blaine, President Cleveland and Secretary Root strengthened political friendship between Latin America and the United States—the first (1881 and 1889) by Pan-American congresses, the second (1896) by forcing Britain to arbitrate the Guiana disagreement with Venezuela, the third (1907) by visiting the southern republics. They participated honorably in the Hague peace-conferences of 1899 and 1907. Argentina, Brazil and Chile have progressed materially.

The Panama canal, which Saavedra suggested in 1520, will immeasurably benefit South American as well as North American countries.*

America, the popular name of the tune to which the words "My Country, 'Tis of Thee" are commonly sung. The national song of England, "God Save the King," is adapted to the same music. We also find it in use in Denmark, Switzerland, Germany and other countries as a national song. Its origin has been ascribed to Lully, to the Scotch, to Purcell, to Dr. Arne, to Henry Carey and to Dr. John Bull. The words, "My Country, 'Tis of Thee," were written by Rev. Dr. Samuel F. Smith, and first used at a children's celebration in Park Street Church, in Boston, July 4, 1832. (See GOD SAVE THE KING.)

American Legion, The. When war in Europe seemed possibly to embroil other countries in the conflict, a corporate body led by Arthur H. Sullivant was formed March 6, 1915, for the purpose of enrolling all citizens in the United States who, because of any past service or technical knowledge, would be well fitted for service immediately if needed. It did not pretend to be a body of national defense, but rather a bureau that could render definite service to the government.

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* "Our southern neighbors in this Hemisphere," says Director General Barrett of the Pan American Union, "will enjoy, because of the opening of the Panama canal, the greatest material, commercial, and economic development which any group of nations has ever experienced in the history of the world."

This organization served its purpose and disbanded. The Legion of today is an entirely different organization, except in name, which the earlier Legion had copyrighted and at the forming of the new American Legion willingly passed on to the new organization. In brief, it is an organization of the American veterans of the World War, non-partisan, non-political, non-sectarian, open to all members who served honorably between certain dates, without distinction of rank or between over-seas and American service. There were over 10,000 posts organized within three years after the war.

There is a Women's Auxiliary of The American Legion, open to mothers, sisters, wives, and daughters of eligible members of the Legion.

American Indians. See INDIANS.

American Institution, an institution founded at washington, D. C., in 1891, with the design of providing advanced instruction for graduates of other colleges, and subsequently placed under the auspices of the Methodist Episcopal Church, with John F. Hurst, D. D., LL. D., as its first chancellor.

American Lion. See PUMA.

American Literature. See LITERATURE.

American School at Athens, The. The American School of Classical Literature, Art and Antiquities, in Athens, was founded in 1881 at the suggestion of Professor Charles Eliot Norton. It is supported partly by endowment and partly by contributions from American colleges and universities. It affords opportunities for advanced study of ancient Greek civilization, and carries on archæological investigations. It has made important excavations in Argos, Crete and other places. The results of the studies and excavations are reported in the *American Journal of Archæology.*

American School in Rome. This school was founded in 1895 by the Archæological Institute of America, and is supported by a number of American colleges and universities and by private gifts. Generous donations have also given it ample endowment funds. The school is under the immediate superintendence of a resident professor, the director, who is assisted by a faculty of four specialists. The object of the school is "to promote the study of classical literature in its bearing upon antiquities and history; of classical, Etruscan and Italic art and archæology, including topography, palæography and epigraphy; and of the art and archæology of the early Christian, the mediæval, and the renaissance periods within the boundaries of Italy." The school year extends from October to July. Part of this time is usually spent in study in Greece.

American University, founded in 1893 at Harriman, Tenn., under the denominational auspices of the Christian Church. Its president was James A. Tate, M. C., and it had a teaching faculty of 12 professors, with a student attendance, in 1906 of 317. It had a small library of about 2,500 volumes. It has since been discontinued.

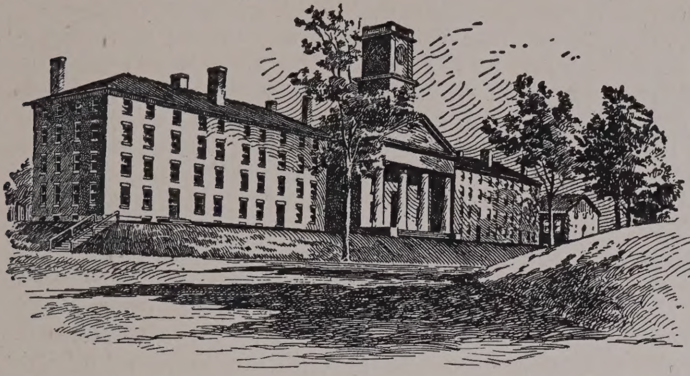
Amer′icus Vespu′cius or **Amerigo Vespucci** (*vĕs-pōōt′chē*) (1451–1512), an Italian navigator, who in the era of Columbus, about the close of the fifteenth century, made several voyages to the northern coast of South America, and, it is alleged, made one voyage to North America, sailing along the coast of Florida as far north as Chesapeake Bay. There is doubt cast upon some of these voyages, though it is said that at least one of them was made in company with Columbus, while Vespucius wrote and published in his day narratives of all of them. What at least is certain is that the newfound continent came to bear the Florentine navigator's name, though this was not by his own seeking nor from any wish on Vespucius's part to detract from the honor due to Columbus in naming the New World America. What otherwise is known of Vespucius is that he was for a time in the commercial office of the Medici in Florence, and later on became a merchant at Seville, whose business it was to furnish supplies and to fit out vessels engaged in foreign trade. See Fiske's *Discovery of America,* Thatcher's *Continent of America* and Harrisse's *Discovery of North America.*

Ames (*āmz*), **Fisher** (born 1758, died 1808), an American orator, statesman and political writer. He graduated at Harvard College at the age of 16, and after a few years entered the law. At the same time his essays in the Boston newspapers under the names "Camillus" and "Brutus," made him well known. He was a member of the Massachusetts convention which ratified the Constitution in 1788, and was the first representative in Congress from his district, which then included Boston. He was especially famous for his energy and eloquence in debate.

Amesbury (*āmz′bĕr ĭ*), **Mass.,** a town in Essex County, on the Merrimac River, 27 miles from Salem and 45 from Boston. It has manufactories of cotton and woolen goods, machinery, carriages, boots and shoes, hats, etc. From 1836 it was for many years the residence of the poet Whittier. Population, 9,849.

Am′ethyst (*ăm′ēthĭst*), a purple variety of rock crystal or quartz. Its name comes from the Greek, meaning "to prevent intoxication," and was given it because of the idea held by the ancients that liquor drunk from a cup made of amethyst would not intoxicate. It is found in Brazil, Ceylon, India and many other places, and is much worn in the form of rings, seals, etc. The oriental amethyst is a variety of the sapphire.

Amherst (*ăm′ĕrst*), a town of Massachusetts, about 82 miles west of Boston. It is known as the seat of Amherst College, a Congregational institution founded in 1821. The original purpose of the college was to educate young men for the ministry. There are now 50 instructors and 502 students, with an art gallery, a library of 52,000 volumes, memorial chapel, gymnasium, observatory and rare museum of Indian relics Nineveh antiquities, minerals and tracks in stone. It has a fine collection of casts from famous statuary, a park of twenty-six acres, with ball and tennis grounds. Near the town is the Massachusetts Agricultural College, considered one of the best agricultural schools in America. Population, 5,112.



AMHERST COLLEGE CHAPEL AND DORMITORIES

Ami (*ä'mee*), **Henry M.,** M.A., D.Sc., F.G.S. and F. R. S. of Canada, was born at Belle Riviére, near Montreal, Nov. 23, 1858. He is the son of the late Rev. Marc Ami of Geneva, Switzerland. He was educated in the Ottawa public and grammar schools and at McGill University, where he took high honors, and in 1903 was awarded the Bigsby medal by the Geological society of London, Eng. He was the paleontologist of the geological survey of Canada from 1882 to 1912, and is the author of many papers on the paleontology and chronological geology of Canada. His home is in Ottawa, and there he edited the *Naturalist,* from 1895 to 1900.

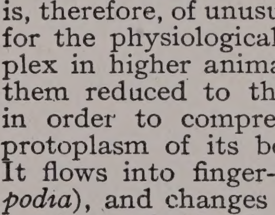
Amiens (*a'mē-än'*), a manufacturing city of France, formerly the most important in Picardy. It possesses a venerable and famous cathedral. Population, 93,207. The well-known treaty of Amiens, which ended a war that had lasted ten years, was made by Great Britain with France, Holland and Spain in 1802. Both in the Franco-Prussian and the European Wars Amiens was captured by the Germans and made the victim of their barbarous destructive policy but the beautiful old cathedral which was generally considered the finest Gothic architecture in France, although injured was not ruined as was that of Rheims.

Am'men, Daniel, was born May 15, 1820, in Ohio, and entered the navy as midshipman in 1836. During the Civil War he took part in the battle of Port Royal, and in the attacks on Fort Fisher and Fort Sumter. He became commodore and afterward rear-admiral, retiring in 1878. He died July 11, 1898.

Am'mon, an Egyptian god, connected by the Greeks and Romans with Zeus or Jupiter. The Egyptians called him Amen, the hidden god, and in the earliest times represented him as a man, but in later times as a ram or a man with a ram's head. He had famous temples in Thebes, Egypt, and on the oasis of Ammon in the Libyan desert and in many other places.

Ammo'nia, a gas (NH_3), which is dissolved by water with great avidity, making an alkaline liquid called ammonia-water or, by chemists, ammonium hydroxide, which is the common form in which it is used. The name is probably derived from the temple of Ammon in the Libyan desert, where ammonia was produced. The name hartshorn is also used, because the shavings of horns have been used to prepare it. It is composed of nitrogen and hydrogen, and is obtained chiefly from the waste liquors of the manufactories of illuminating gas. Ammonia gas may be changed to a liquid or solid by cold and pressure. An important use of liquid ammonia is in the manufacture of ice. (See Ice.) Ammonia unites with acids to form ammonium salts. The carbonate is much used for smelling salts, the chloride is used in soldering and in medicine, and the sulphate and other salts are valuable fertilizers.

Amœ'ba, one of the lowest microscopic animal organisms, extensively used in laboratory work in biology. The amœba is a single cell (see Cell Doctrine); its body is a mass of protoplasm. Therefore, when we make observations upon it we are observing protoplasm at first hand and can determine its properties and behavior. Within its body all the physiological acts take place in a simplified form. It is, therefore, of unusual interest to biologists, for the physiological processes are so complex in higher animals that one must have them reduced to their simplest expression in order to comprehend them. The soft protoplasm of its body is always moving. It flows into finger-like processes (*pseudopodia*), and changes its position from place to place. It also flows about food particles and thereby engulfs them into its substance. The amœba is found in stagnant water, moist moss, etc. The living substance of its body is contractile, like muscles; irritable, like nervous tissue; receptive, assimilative, respiratory, reproductive, etc.—the germs of activities that are more developed and



AMŒBOID CELLS

perfected in higher animals. See PROTOZOA.

Amos, a Hebrew prophet who lived about 800 B.C. He was a herdsman and a dresser of sycamore trees in the region of Tekoa, a fortified town south of Judah. He vigorously denounced the idolatry of the Jews, which was so prevalent during the reign of Uzziah in Judah and of Jeroboam II in Israel, and prophesied the anger of God against idolatrous nations. He is the author of the book of Amos in the Bible. His language is remarkable for its simplicity and clearness.

Ampere (*ăn'pâr*), the "practical unit" in which electric currents are measured. The numerical value of the ampere, as established by the International Electrical Congress, which convened in Chicago in 1893, is "*the practical equivalent of the unvarying current which, when passed through a solution of silver nitrate in water, in accordance with standard specifications, deposits silver at the rate of 0,001118 grams per second.*"

This definition, having been ratified by Congress, now defines the "legal ampere."

The logical definition of the ampere, and the one which the legal unit approximates as nearly as possible, is "a current equal to one-tenth of the absolute unit of current."

See ELECTRICITY.

Ampère, André Marie, a distinguished French physicist and mathematician, was born at Lyons in 1775. After the death of his father in 1793 under the guillotine, young Ampère devoted himself to study. He became a professor of physics at the University of Paris and a member of the French Institute in 1814. His most important contributions to the world of knowledge are, perhaps the three following:

First: His clear analysis and mathematical description of the work of Oersted. It was in the autumn of 1820 that Oersted discovered the effect of an electric current upon a magnetic needle. In less than one week after learning of this discovery, Ampère had extended the results by experiment and had reduced the description to a mathematical formula.

Second: The discovery that electric currents produce a magnetic effect upon each other so that when the currents in two wires are flowing in parallel directions, they attract each other; but, when flowing in opposite directions, repel each other.

Third: Ampère introduced the very fruitful hypothesis that magnetic substances are made up of molecules in which electric currents circulate but meet no resistance. These currents are therefore permanent. According to this view, a body is magnetized when its molecules are made to face more or less one way.

See ELECTRICITY.

Amphibia (*ăm-fĭb'ĭ-á*), a natural class of vertebrate animals which include frogs, toads, salamanders, newts, etc. The peculiarity about the amphibia is that they pass through a tadpole state. They are at first adapted to living in the water and breathe by gills and have no legs. They gradually change, however, and the gills usually disappear and the lungs and legs are developed. They are intermediate between fishes and land animals or reptiles. Sometimes the gills are retained throughout life, as in the mud-puppy (*Necturus*) and the Mexican axolott. These forms have both lungs and gills. The salamanders are like lizards in form but are different in structure and development. Fossil amphibia are found imbedded in the rocks with a body as large as an ox.

See FROG; SALAMANDER; TOAD.

Amphitheater. See COLOSSEUM.

Amsterdam (*ăm'stẽr-dăm*), the capital and an important city and seaport of the Netherlands. The city is built on an arm of the Zuyder Zee, the Ij, in the shape of a crescent, and since the site is a marsh it is founded on piles driven deep into the soft peat and sand. Dikes guard the city against the tides, which rise higher than the city's level. A system of canals with the river Amstel divide the city into ninety-four islands connected by many bridges of iron, stone and wood, hence the name of the city, Amsterdam, meaning "the dam or dike of the Amstel." The Amsterdam Canal, uniting the city with the North Sea, has recently been greatly enlarged and deepened, tidal locks being affixed at either end—the Zuyder Zee end and the North Sea entrance.

In the thirteenth century Amsterdam was a small fishing village. By the close of the seventeenth century it had become the first commercial city of Europe. After years of decline following the war with England in the latter part of the eighteenth century, it has again risen to commercial importance. Amsterdam today is an important financial center of the world. The most important of its financial institutions is the Bank of the Netherlands, which was established in 1814 and was modelled after the Bank of England. The renowned Bank of Amsterdam, established in 1609, which was dissolved in 1796, was its predecessor. Amsterdam's stock exchange is still of considerable importance among the world's commercial institutions.

The most important industries of the city are shipbuilding and iron molding, diamond cutting and polishing, and the manufacturing of linen, silk, velvet, porcelain, canvas, machinery, glass, and rope. Transportation facilities have been very well developed in Amsterdam. Electric lines and a suburban steam railway serve the city and there are railway and steamship line communications with the interior.

Amsterdam has many imposing structures which lend added beauty to its boulevards. The royal palace, the old statehouse, which was erected in 1648, contains one of the largest and most magnificient banqueting halls in all of Europe. There are many important educational institutions situated in Amsterdam chief among which are the Academy of Art, the Riijks Museum, the Royal Academy of Sciences and several public societies such as the Society of Public Welfare the object of which is to promote education and the improvement of all classes. Branches of this society are to be found in nearly every town and village of the Netherlands. Among the most outstanding edifices of the city are the cruciform New Church, a Gothic structure which was constructed in 1408, and the Old Church, constructed in 1300. The latter is especially famous for its stained glass.

The population of the city, which, on January 1, 1932, was estimated at 766,263, is composed chiefly of Dutch, Jews and Germans.

See NETHERLANDS, THE; ZUYDER ZEE.

Amsterdam, a city of Montgomery County New York. It is situated about thirty miles from Albany on the Erie Canal and on the north bank of the Mohawk River. It is served by the West Shore and the New York Central railroads. Amsterdam is an important manufacturing city. Its principal manufactures are pearl buttons, carpets, rugs, knit-goods, wagon-springs, paper, paper-boxes, silks and brooms. There are important foundry and machine shops situated here.

The first settlement was made here in 1778 and was known as Veedersberg until 1804. The present city was incorporated in 1885. In 1930 the population was 34,817.

Amundsen (ämŭn′-sĕn) **Captain Roald.** For nine months of the year no stranger comes to the mining camp of Eagle City, Alaska. It is on the Arctic circle, and its one street of log houses fronts on the frozen flood of the Yukon. When, therefore, one short, dark day in December, 1905, a dog-sledge dashed into town over the ice of the river, not from the coast 150 miles to the west, but from the north, down the slopes of the Canadian Rockies, everyone was amazed. The stranger was of powerful build and had the sea-blue eyes and blond coloring of a Norse viking. He was clothed in yellow sealskin, and his dogs were of Esquimaux breed, unlike Alaskan huskies.

"Captain Roald Amundsen of the Sloop Gjoa, Christiania, Norway," is the way in which he registered in the log hotel. It was the Norwegian explorer, whose little ship had been reported crushed in the ice six months before. He had sailed from Greenland to the mouth of the Mackenzie River, through the Northwest Passage that had been sought for very nearly four hundred years—from the time Sebastian Cabot coasted along Labrador, in 1497. He had spent two long years on King William's Land, where Sir John Franklin had perished sixty years before; had determined the position of the Magnetic North Pole in King William's Land; and had brought his gallant little craft and crew of six men through unharmed.

Roald Amundsen was born of Norwegian parents at Borge, Smaalenene, Norway, on July 16, 1872. He was educated at the University of Christiania. After two years spent in the study of medicine young Amundsen entered the Norwegian naval service. In 1897 he became first officer on the *Belgica* in the South Pole Expedition. Upon the return of this expedition in 1899, Roald Amundsen became interested in locating the magnetic North Pole and making the Northwest Passage, both of which Sir John Franklin's expedition had determined to lie in the vicinity of King William's Land and Boothia. He sought the friendship of the Arctic explorer Dr. Nansen, and studied terrestrial magnetism at Wilhelmshafen, Hamburg and Potsdam. He fitted out a seventy-three foot, sixty-ton sloop, the *Gjoa*, propelled by a petroleum engine and manned by six Norse sailors. He left Christiania in June, 1903. Dogs and supplies were obtained at Godhaven, Greenland, and then the explorer disappeared. Two years later, in October, 1905, he reached Herschell Island, Mackenzie River. Here he was frozen in. He made his way overland to Alaska and returned in the spring taking the *Gjoa* around through Bering Strait to San Francisco.

Amundsen's crowning achievement was the discovery of the South Pole. He sailed from Norway in Nansen's vessel, the *Fram*, in 1910. Early in 1911 he reached Whales Bay, where he went into winter quarters. In February he pushed south with food supplies and established depots as far as 82° south latitude, then returned to winter quarters. The sun disappeared April 22, and reappeared August 24. On September 8, he started for the pole, but, finding the date too early, he returned to winter quarters. On October 20, with four men, four sledges, fifty-two dogs, and four months' provisions he made his final start for the goal. On November 17, he reached the great ice barrier, latitude 85° to a height of 10,000 feet. Here he killed twenty-four dogs, and with eighteen dogs and three sledges pushed on over a vast plateau clad in snow and glacier ice, reaching the pole on December 14. Here he remained three days, taking observations. He located the pole in a vast plain which he named King Haakon VII Plateau. Winter quarters were reached on January 25, and on March 7, he cabled to Christiania, Norway: *"Pole attained fourteenth-seventeenth December, 1911. All well."*

In June, 1918, Captain Amundsen set out in the *Maud* from Norway with the intention of drifting with the ice current across the Arctic Ocean. He was forced to pass the winter in the Bering Strait. In July, 1920, after a mishap at Cape Serdze, Siberia, he returned to Nome. Another attempt made to reach the pole in 1922, also proved unsuccessful. In 1924, Captain Amundsen, finding himself in financial distress, came to the United States. It was here that he met Lincoln Ellsworth, the American explorer, aviator and engineer who agreed to finance him and with whom he made an attempt in May, 1925, to fly over the

North Pole. One year later, on May 11, 1926, the two intrepid explorers completed a seventy-two hour flight from Spitzbergen to Teller, Alaska by way of the North Pole in the *Norge*, a dirigible designed and constructed by General Nobile of Italy.

After the completion of the *Norge* flight ill feeling arose between General Nobile and other members of the expedition. In 1928, however, when General Nobile met disaster on his second polar flight in the *Italia*, Captain Amundsen volunteered to go to his rescue. On June 17, 1928, the Norse explorer set out with five companions in a French seaplane from Trömso, Norway. No word was ever heard from him again. In the latter part of August in that same year the pontoons of a plane identified as that of Amundsen's were found floating in the ocean.

This magnetic Viking explorer was also distinguished as an author. Among his later writings are included: *The Northeast Passage* (1918-20); *Christiana* (1921); *The First Flight Across the Polar Sea* (1926); *My Life as an Explorer* (1927).

See Antarctic Exploration; Polar Exploration; Byrd, Admiral.

Amur (*ä-mo͞or'*), a river of Eastern Asia which flows into the Gulf of Tartary. It is formed by the junction of the Shilka and the Argun and flows east and southeast along the northern boundary of Manchukuo, north into the Gulf of Tartary. The length of its course is 2,900 miles over which it drains a territory of about 600,000 square miles. Its most important tributaries are the Sungari and Ussari from the south, and the Seya and Bureya flowing from the north. The river is navigable for small vessels throughout the whole 2,900 miles. The winters in the Amur Valley are, however, especially severe and the river is closed to navigation for about six months of the year.

Amur is also the name of a province in Manchukuo which extends over an area of 203,000 square miles. It has a population of approximately 2,500,000. The capital is Tsitsihar with a population of about 30,000.

See Manchukuo.

Anabaptists (*ăn-ȧ-băp'tĭsts*), a sect which appeared in 1523 in Zurich among the followers of Zwingli. The members of the sect advocated the (1) inefficacy of infant baptism; (2) that the true church was composed only of saints, that is, true Christians who had been baptised on confession of faith, and (3) separation of Church and State and non-interference by civil authorities in ecclesiastical affairs. The leader of the group was Thomas Münzer of Waldshut. Much persecution was heaped upon these religious enthusiasts and in time the sect became divided, one group embracing fanaticism and the other mysticism. The fanatical enthusiasts played an important rôle in the Peasant War in Germany in 1525. The Battle of Frankhausen decided the fate of the Anabaptists in Saxony and Franconia. Thomas Münzer was put to death together with many of his followers. New leaders arose in the persons of Knipperdolling, Matthiesen and Bockhold.

In 1534 a group of Anabaptists settled in Münster, Westphalia, where they established the Kingdom of Zion. Community of goods and extreme licentiousness were practised to such ends that it became necessary for the Roman Catholic Bishop to intervene in 1535. The leader of the sect was put to death, their churches destroyed.

The Anabaptists from their inception employed various methods in their baptismal rites including pouring, sprinkling, and immersion. Immersion finally became the adopted mode of baptism.

See Baptists.

Anaconda (*ăn'a-kŏn'dȧ*), a large serpent of the Python family and closely allied to the boa-constrictor. It is found in South America, especially in Brazil and in Guiana. It sometimes grows to the length of forty feet, and is the largest serpent in America. It passes much of the time in the water, choosing the shallow parts of a lake or stream. It is not poisonous. Its skin is used in making boots and bags.

See Boa.

Anaconda, a city, and the seat of Deer Lodge County, Montana, is situated about twenty-eight miles west by north of Butte. It is served by the Northern Pacific; the Great Northern, and the Butte, Anaconda and Pacific Railway. Its chief industry is copper-smelting. The town is growing rapidly, and has some fine public buildings, including the Hearst Free Library, several banks, opera houses, schools, etc. It has also a system of public parks. Its industries include foundries, railway and machine shops, brick works and copper smelting. A gold mining district twenty miles west is reached by an extension of the Butte, Anaconda and Pacific Railway. In 1930 the population was 12,494.

Anæsthetic. the name applied to any agency which causes either partial or complete insensibility to pain. There are two kinds of anæsthetics: those called local anæsthetics, which affect only a limited area; and those called general anæsthetics, which cause temporary insensibility of the whole body. Anæsthetics of various kinds were used by the ancient Greeks and by the Chinese as early as the third century A. D.

When men began to study chemistry systematically, toward the close of the eighteenth century, various anæsthetics were discovered, but it was some time before they came into common use. In 1844 Dr. Horace Wells of Hartford, Connecticut, employed nitrous oxide gas to extract teeth painlessly. In 1846 Dr. Morton of Boston employed the vapor of sulphuric ether for the same purpose, and afterwards applied it in cases requiring surgery. In 1847 Sir James J. Simpson of Edinburgh announced the discovery of chloroform, and suggested its use instead of ether. These three anæsthetics are taken into the system by inhalation. Local anæsthesia is produced by chilling with ice or by the evaporation of some volatile substance like ether or rhigoline. Cocaine is also used extensively for this purpose.

Anam′. See COCHIN CHINA.

Anarchism, a communistic and revolutionary theory adverse to social order, law and government, and manifesting in its votaries—generally men of grandiose ideas lacking in mental equilibrium—an unnatural aversion to their kind, especially if well-to-do and influential, and an implacable fanaticism. The leaders of the movement have been men of prominence in various countries, acting under the impulse given it by such eminent writers as Karl Marx of Germany (1818–83), Pierre J. Proudhon (1809–65), the French socialist, William Godwin, the English political writer (1756–1836) and author of the famous *Enquiry Concerning Political Justice*, Elisee Reclus, the French republicanist, and Prince Krapotkin, the Russian nihilist and revolutionist (1842) and propagandist of social reform. Some of these men are idealists rather than revolutionists, and are opposed to assassination and violent measures in ridding the world of tyrannical rulers and bureaucratic administration. Others of them, however, including many of their more hasty and hotheaded followers, are eager for the overthrow of the existing social order, and are fanatical in their desire to overturn society and give rein to extreme individualistic theories, including resistance by force to all repressive, orderly authority. Hence have come the bomb-throwing and the anarchical assassinations which have been the terror of the time, including revolutionary conspiracy.

Anat′omy. It is a common mistake to suppose that anatomy applies only to the bones; on the contrary, it includes the structure of both animals and plants. Just as the architecture of a house shows its plan of construction, so anatomy, or the architecture of animals and plants, shows how they are constructed, and with the higher animals this is a very complex thing. The physicians and medical men were the first to take an interest in the anatomy of the human body, because a knowledge of it is necessary for medicine, and it thus happens that the earliest observations in this line were directed toward making known the structure of the human body and of animals rather closely related to man in points of structure. Anatomical study, therefore, began with the most complex animals instead of with the simpler ones, and this led to many misunderstandings. It was so difficult in the early days to get an opportunity to study the human body that the pioneer anatomists were obliged to gain their knowledge by dissections of animals like the dog and occasionally of a monkey. Aristotle (B. C. 384–322) and other ancients learned a great deal about anatomy in this way.

About B. C. 300, the dissection of the human body was legalized in the Alexandrian school, the bodies of condemned criminals being devoted to that purpose. But this did not become general, and anatomy continued to be studied mainly from brute animals.

Finally, in the early part of the Christian era, Galen (130–200 A. D.), became accepted as authority, from the 2d century, in which he lived, to the revival of anatomy in the 16th century. During the decline of intellectual life, in the dark ages, there was no progress. In the 14th century, observations were renewed, but no particular advance was made for about two centuries. Then a highly-gifted man of great intellectual power — Vesalius (1514–1564)—was born, who gave himself to the study of anatomy. Under his hands the science underwent a revival, and his work marks an epoch. In 1543, at the age of 29, he published a book (*De Corporis Humani Fabrica*), most beautifully illustrated, which is accepted as laying the foundations of modern anatomy. In this book he corrected many errors of Galen, and claimed that the knowledge of that anatomist had been gained from the bodies of apes and other brute animals, and not from man. Vesalius had with great difficulty procured the bodies of some criminals for his studies, and he reaped the displeasure of the authorities and of the Inquisition, by whom he was threatened. He found himself in controversy with his teachers and contemporaries, most of whom defended the authority of Galen, but in due course of time his position was triumphantly established and the authority of Galen overthrown.

Anatomy began now to assume more importance, and there arose famous teachers of the subject. The Italians were at this time in the lead—the prejudices against dissection in Germany, France and Britain prevented the development of the subject in those countries. The school at Padua became deservedly famous, and students were attracted to it from all over Europe and Britain. From England, William Harvey (1578–1657) found his way to Padua as a medical student. In the early part of the 17th century, he made an epoch in both anatomy and physiology by the demonstration (1628) of the circulation of the blood. Among the famous Italian teachers of the period were the leaders in anatomy: Vesalius, Fallopius and Eustachius (from whom is named the Eustachian tube). Thus in the 16th century human anatomy was well established.

The subject became broadened. Naturalists began to take more interest in animals and plants, and there gradually grew up those who compared the structure of higher animals with the simpler ones. These comparisons brought out so many resemblances and so many remarkable facts as regards construction, that anatomy, which seems at first a dry subject, became endued with great interest. Presently it was discovered that insects have a most beautifully constructed organization; that they have delicately formed organs for digesting their food, with fine salivary glands, a remarkably beautiful nervous system, breathing tubes, etc. Thus there was opened a new world to anatomists. These studies in minute anatomy fascinated all who undertook them; and well they might, for there are no more beautiful illustrations in nature of delicate structures nicely adapted to the purposes of life. Malpighi the Italian and two Dutchmen, Swammerdam and Leeuwenhoek, were the leaders in this field, and the sketches with which they illustrated their studies excite our admiration even to-day. Malpighi and Leeuwenhoek also began to apply the microscope to anatomical study, and a new line of advance was started, involving minute or microscopic anatomy. The same kind of architectural study was extended to the other groups of lower animals, and a great fund of new knowledge was acquired.

At the same period Malpighi, Grew and others laid the foundations of the knowledge of the minute structure of plants.

The interest of naturalists kept deepening, and finally, just at the beginning of the 19th century, the great Cuvier (1769–1832) founded the science of comparative anatomy. The men who have followed in his footsteps and made the work, in this particular line, more modern, are Meckel, J. Müller, Rathke and Gegenbaur in Germany; Richard Owen, Goodsir and Huxley in England; and Joseph Leidy and E. D. Cope in America.

Simultaneous with the work of Cuvier came that of his equally distinguished contemporary Bichat (1771–1802), who, while Cuvier was studying principally the organs, directed his attention to the tissues of which the organs are composed. Bichat took a step further than Cuvier. He founded the Department of Histology or Microscopic Anatomy of organs. This line of analysis was, in 1839–40, carried still further by Schwann and Schleiden, who showed that the tissues are composed of cells. All anatomy since 1840 has been greatly modified and influenced by this cell theory.

Having gained some knowledge of the construction of animals and plants, it is natural that the next step should relate to the process of building. Since it is known that all animals and plants start in a relatively simple microscopic rudiment—a seed or an egg—we wish to know, further, something about the series of steps by which this simple rudiment is converted into the highly complex organism. This line of study is called Embryology or Development. As early as 1769, Wolff showed the true nature of development, viz., that it is an actual process of construction, and not simply the expansion of a preformed miniature, as was quite generally believed in his time. But Von Baer (1792–1876), is regarded as the founder of the modern ideas of development. He showed that all the organs and tissues in the bodies of animals proceed from three first-formed layers of cells or the germ-layers and that corresponding tissues come from the same one of the three layers in all animals above the very lowest. The facts of development, taken in connection with the doctrine of organic evolution, have greatly influenced the progress of anatomy. Comparative anatomy, especially, has been the gainer. The comparative structure of animals assumes new meaning when we understand that the higher animals are connected by a series of gradations with the lower ones, and that the higher animals present many fundamental features of resemblance to the lower ones in very early stages of their development.

This is, briefly, the story of the rise of anatomy. It shows how the study began with a narrow aim,—that of making known the structure of the human body for the use of medical men; then, after various vicissitudes, how it was broadened and deepened to include the structure of all living beings; and how, finally, the story of the development of life was added to that of its structure. Anatomy has thus come to be an important department of biology.

Let us now see what are its principal subdivisions: We must, of course, have descriptive and surgical anatomy for medical men. We must also have physiological anatomy to understand the workings of the organs. We must have microscopical anatomy in health, which is called histology, and in disease, which is called pathology.

The study of comparative anatomy is important to the zoologist and botanist. In these connections, it is usually called morphology, a name contrasted with physiology. In the broad sense, this includes the construction of all plants and animals from the simplest to the highest. Finally, we have anatomy for artists.

But it is all too large a field to be even systematically outlined here. For a knowledge of the facts of anatomy one must consult special books. Gray's and Quain's *Anatomies* are the ones most used at present by medical students. For comparative anatomy of vertebrates, the manuals of Gegenbaur and Weidersheim are recommended. For general morphology, Thompson's *Zoology* and Parker and Haswell's *Text-book of Zoology* are among the best. For comparative anatomy of invertebrates, see Lang's *Text-book of Comparative Anatomy.* Wm. A. Locy.

Anaxagoras (*an-aks-ag'ō-ras*), a Greek philosopher of Clazomenæ, in Ionia, born about 500 B. C. At Athens he had for his pupils Pericles, Thucydides, Euripides and Socrates. He is spoken of as the first theist among philosophers, since he deemed reason the source of truth and matter the creation of an eternal Being, which he called **νους** (Intelligence). His atomic theory was thought at the time to be a slur on the gods, and for that he was banished, proceeding to Lampsacus, Mysia, where he taught until his death about 428 B. C.

Anchises (*an-kī'sēz*), in Greek legend. the son of Capys and father, by Aphrodite, of Æneas, the Trojan hero. At the burning of Troy, Æneas rescued him and bore him on his shoulders out of the city and made him the companion of his voyage to Italy. On the way thither, Anchises died in Sicily.

Ancho'vy, a small fish related to the herring, much used as a relish and for sauces, etc. They abound in the Mediterranean Sea and on the southern shores of Europe. Anchovies are also found on the coasts of the United States.

An'cient Mar'iner, The, a romantic poem written by Samuel T. Coleridge in 1797, first appeared in the famous volume of *Lyrical Ballads,* by Wordsworth and Coleridge which appeared in 1798. Wordsworth appears to have suggested some of the incidents of the story, for instance, the suggestion of a spectral persecution for a crime and the incident of the albatross. But the imagination and melodious beauty of the poem belong to Coleridge alone. The story is of an ancient mariner, who holds one of three wedding guests by the weird influence of his story and the glitter of his eye. He tells of a voyage to the South Seas, of heat and fog and mist, of the slaying of the bird that was thought to have caused it and of the punishment of the crew who perished and himself who lived in the clutches of the "Nightmare life-in-death." The rime concludes with the moral:

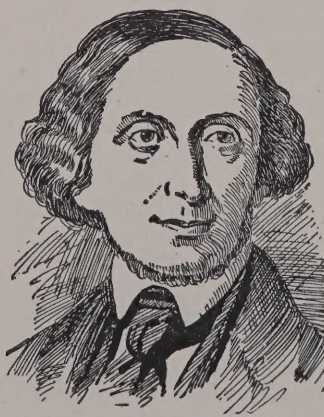
"He prayeth best who loveth best
All things both great and small;
For the dear God who loveth us,
He made and loveth all."

The ancient mariner had indeed broken the spell of evil about him, at least in part, by the love that gushed out of his breast towards the beauteous water-snakes that were playing about his stricken ship. Yet it is better to regard this poem as a perfect work of imagination than a too severe parable.

Anco'na, a city of Italy on the Adriatic Sea. It was one of the chief naval stations of the Romans. At that time its citizens made a famous purple dye, used in coloring the cloaks worn by kings and emperors. On its mole stands a triumphal arch in honor of the Emperor Trajan, which is said to be the finest marble arch in the world. Ancona has a fine harbor; it is to-day the chief seaport between Venice and Brindisi. Population 63,145. The province of the same name has an area of 748 square miles, and a population of 318,683.

Andalusia (*ăn'dȧ-lōō'shĭ-ȧ*), the most southern district of Spain. It is crossed by the Sierra Nevada Mountains and is watered by the Guadalquivir River. Here the Moors set up their famous kingdom and threatened to overrun Europe. The Andalusian towns, Seville, Cordova, Jaen and Granada were the Moorish capitals. The present Andalusians are like the Moors in looks and manners, but are a mixed race, descended from Africans, Carthaginians, Romans, Goths and Vandals as well as Moors. The climate of Andalusia is delightful, and the country is rich in grains and fruit. It has also considerable mineral wealth. Its area is 34,000 square miles. Population of the eight provinces included in the area, 3,562,606.

An'dersen, Hans Christian, a Danish poet, novelist and writer of children's stories. He was born in Odense in 1805, the son of a shoemaker, who died when his son was nine years old. After a scanty education and various attempts at work, his mother wished to make a tailor of him, but Hans, having a fair voice, preferred to go to Copenhagen for training. There he tried to get work at a theater, but was laughed at for his ignorance and awkwardness. A struggle of a few years, during which he wrote several tragedies, ended by his admission, through the influence of a benevolent man, into one of the government schools. This was the turning point in his life. He soon entered the Royal College of Copenhagen, and while there produced his first work in print, *A Journey on Foot to Amak,* a humorous work, which gained him much favor. Having received a gift of money from the king, he traveled through the south of Europe, describing its beautiful scenery in his great novel, *The Improvisatore.* After his return to Denmark, he was given an annuity by the government, until his death, which occurred Aug. 4, 1875. Among his works are *Only a*

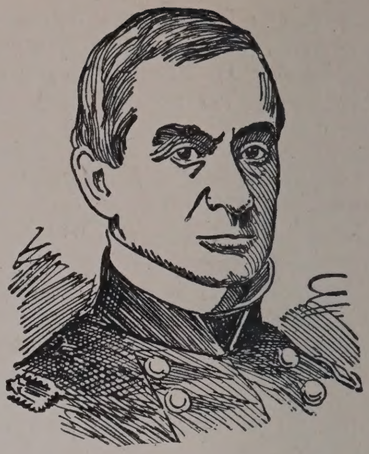

HANS ANDERSEN

Fiddler, A Poet's Bazar, Fairy Tales, Wonder Stories and *Picture Books Without Pictures.* His books have been translated into all the languages of Europe, and also into Chinese and Japanese. Hans Andersen was tall and thin and wore old-fashioned clothes, but as he walked the streets of Copenhagen the children flocked around him and the boys and girls saluted him. When he died, flowers were sent from many countries, and later on, all were glad by their subscriptions to help to erect a monument to his memory.

An'derson, a city and county seat of Madison County, Indiana, on White River, 36 miles from Indianapolis. It lies in the center of an agricultural region, and besides has extensive manufacturing interests. It manufactures glass, wire fence, steel springs, shovels, files, automobiles, carriages, nails, shovel handles, carriage and buggy materials, tools and tool-workers supplies, encaustic tiles, tin plates, etc. The city has an admirable system of public schools, substantial buildings, a fine library and churches. It has the service of four railroads, and is the center of the traction lines for northern and central Indiana, and located here is the largest power-house in the state. Anderson has all the adjuncts of a modern city, and while the natural gas flow is somewhat diminished since its discovery in 1887, the supply is sufficient for heating and some manufacturing. Anderson town was settled in 1822, became a county seat in 1828 and the city incorporated in 1865. Population, 30,000.

An'derson, Mary, an American actress, was born at Sacramento, California, July 28, 1859. When only 13 years old she decided to become an actress. Soon after she met the great Charlotte Cushman and at once went to New York to study. Here, when but 16 years old, she made her first appearance on the stage as "Juliet," with complete success. She was soon acknowledged to be the leading actress of the United States and became very popular being known everywhere as "Our Mary." A beautiful, frank, pure-hearted girl, she did much toward convincing Americans that stage life may be pure. She has not appeared on the stage since her marriage, in 1889, to Mr. Navarro, a wealthy New Yorker. In 1896 she issued a volume of reminiscences under the title of *A Few Memories.*

Anderson, Robert, General (born 1805, died 1871), was a West Point graduate, serving in the Black Hawk and Mexican Wars, and was wounded at the battle of Molino del Rey. As major of artillery he had charge of the defenses in Charleston harbor in 1860. On the night of December 26, expecting an attack from the South Carolinians, he moved his small garrison from Fort Moultrie to Fort Sumter, as being more easily defended. On April 14, he evacuated the fort after a bombardment of thirty-six hours, marching out with the honors of war. This was the first engagement of the Civil War. He was appointed brigadier general, but his health prevented his engaging in much active service.


ROBERT ANDERSON

An'dersonville, a village in Sumter County, Georgia, noted as the site of a Confederate military prison during the Civil War. Here 12,296 Federal prisoners died in fourteen months, largely the result of exposure and lack of food and sanitation. The superintendent, Henry Wirz, was tried by a military court, found guilty of cruelty to prisoners and hanged November 10, 1865.

An'dover, a town of Massachusetts, on the Merrimac River. It is chiefly known by its educational institutions. It is the seat of Phillips Academy, founded in 1780 as a school for preparing boys for college. This school has a large endowment and is well fitted in every way for carrying on its work. Here, also in 1808, under the same trustees, was founded Andover Theological Seminary, (recently removed to Harvard University), which has sent forth 3,000 Congregational ministers. It has a library of 50,000 volumes. Among its buildings stands the house in which Elizabeth Stuart Phelps wrote *Gates Ajar.* Andover is also the seat of the Abbot Female Seminary. Population, 7,301.

Andrassy (*on'drā-shē*), **Julius, Count,** a Hungarian statesman of an ancient and noble family, was born in 1823. He took a prominent part in the Revolution of 1848, leading the militia against the Austrians and going as ambassador to Constantinople. He was an exile for several years in France and England. He was several times a member of the national assembly, and in 1861 its vice-president. He was Hungarian prime minister of the consolidated Austro-Hungarian empire in 1867-68, minister of national defense, foreign minister and advocate of many reforms. He died February 18, 1890.

Andre (*än'drā*), **John, Major,** a British officer in the Revolutionary War, hanged as a spy at Tappan, N. Y., October 2, 1780. He was born in London in 1751 and came to America at the age of 23. He became aide-de-camp to General Grey and afterward to Sir Henry Clinton, who promoted him to the rank of major and made him adjutant-general of the British army in North America. He soon entered into correspondence with General Benedict Arnold, with the object of betraying the American cause to Clinton. In August, 1780, Arnold took command of West Point, on the Hudson River, then the strongest and most important post in the United States. He proposed to begin his treason by giving up this fortress to the British. He asked for a personal interview with André, who went up the Hudson and landed one dark night from the war sloop *Vulture*, about six miles below Stony Point. Here he met Arnold, who gave him a passport under the name of John Anderson, which allowed him to pass the American lines, and also six papers in his own handwriting directing the attack on West Point. These papers André concealed in his stockings, and then started in disguise to ride to New York, for the sloop had been forced to return down the Hudson. At Tarrytown he was stopped by three armed men, to whom he declared himself a British officer, supposing them to be Tories. They belonged to the American side, however, and immediately searched him and found his secret papers. He offered bribes, but they were refused, and he was taken to Tappan, the headquarters of the American army, where he was condemned to be hanged as a spy. Every effort was made to save him, but the rules of war demanded his death. He was hanged in the full uniform of a British officer, calling upon the crowd to witness that he died like a brave man. His talents and the sunshine of his disposition caused him to be mourned by both British and Americans.

Andrew. See APOSTLES.

Andrew, John Albion, was born at Windham, Maine, May 31, 1818. He was elected governor of Massachusetts in 1860, and four times was his own successor. He was one of the most famous of the "war governors." Within a week after the President's call for volunteers, he dispatched five regiments. His speeches, messages and especially his devotion to the welfare of the soldiers made him very popular. He died October 30, 1867.

Andrews, Elisha Benjamin, an American educator, formerly president of Brown University and later chancellor of the University of Nebraska, at Lincoln, was born at Hinsdale, N. H., January 10, 1844. During the Civil War he served in the army, and lost an eye at Petersburg in August, 1864. Graduating subsequently at Brown University, Providence, R. I., he became principal of the Connecticut Literary Institute at Suffield, Conn., and later on was professor of history and political economy at Cornell, and president of Brown University, his alma mater. Owing to criticism by trustees of the University of his belief in the free coinage of silver, President Andrews resigned, though the resignation for a time was recalled and not acquiesced in. He subsequently accepted the superintendency of the Chicago schools. This position he resigned in 1900, and accepted the presidency of Nebraska University. He was the author of a number of standard text-books on history, constitutional and general, and on economics. He died in 1917.

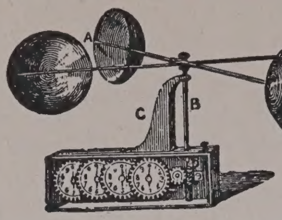
Andromache (*an-drom'a-kē*), the wife of Hector, and one of the most celebrated and beautiful of the women of Troy. She lost her husband and seven brothers in the Trojan War, became the captive of Pyrrhus, the son of Achilles, and finally the wife of Helenus, a son of Priam. She is the subject of *Andromache*, the tragedy of Euripides.

Andromeda (*an-drom'e-dȧ*), in Greek mythology the daughter of Cassiopeia and Cepheus, king of Ethiopia. Boasting that she was more beautiful than Juno, the latter's brother, Neptune, sent a sea monster to threaten her life and ravage the country. From this peril and being chained to a rock, Andromeda was rescued by Perseus, and after death was transformed into a constellation. The constellation, with its satellites, is represented by a woman in chains.

An'dros, Sir Edmund (born 1637, died 1714), was governor of the colony of New York for eight years, beginning in 1674; subsequently he was governor of New England for three years. He was deposed by the colonies and then was made governor of Virginia for six years. He was harsh, and ruled without any regard to the wishes of the colonists. This made him disliked, in spite of his acknowledged honesty and uprightness. His demand for the charter of Connecticut is famous. To get it, he went to Hartford with a band of soldiers. The general assembly kept him talking in their hall until night, when candles were lighted and the charter brought in a box and laid on the table. Suddenly the lights were blown out. They were quickly lighted again, but the charter was gone. For three years no one knew where it was, but in 1789, when the new king, William III, had recalled Andros, the charter was carefully taken from the hollow of an oak tree, where it had been hastily put on the night it disappeared. This tree was known as the "Charter oak."

Androscog'gin, a river which rises in New Hampshire, flows through part of Maine, and enters the Kennebec River near Bath. Length, 145 miles.

Anemom'eter, an instrument for measuring the rate and pressure of the wind. There are several instruments for this purpose; the simplest and the one most used was invented in 1846 by Dr. Robinson. It consists of four hollow cups fastened to the ends of two horizontal iron rods which cross each other at right angles, and which are supported on a vertical rod which turns freely. It looks like four spokes of a wheel at right angles to each other, each having a cup on the end to catch the wind, and the axle in which they are fitted being set up on end. This axle or rod is connected with a set of wheels, which records the number of revolutions. It was found that the cups whirl round with about a third of the velocity of the wind, and so, from the number of the revolutions, it is easy to calculate the rate of the wind. Another kind of instrument is the pressure anemometer. The best known is Osler's. A brass plate is fastened by springs to a vane in such a way that the varying pressure of the wind on the plate causes the springs to yield in corresponding degrees, and this is recorded on a moving sheet of paper by a pencil fastened to the vane; another pencil records the changes in the direction of the wind, and usually a third pencil, guided by a rain gauge, shows the amount of rain that has fallen.



ANEMOMETER

Anemone (*ȧ-nĕm′ō-nē*), called also the wind-flower, is one of the most beautiful of our spring flowers. It grows wild in woodlands and pastures. When growing in the shade, the colors are pink, rose color or purple; in the sun, they appear white or slightly flushed with rose color. The flowers of the wild anemone are single, but they can be doubled by cultivation. At the approach of night or of rain they curl up and go to sleep. The plant is well fitted to be an early spring blossom, for its slender stem bends but does not break in strong blasts. Poetry and myth give many stories of this flower. The Greeks said *Anemos*, the Wind, sent forth the starry blossoms as heralds of spring. It was believed that only the wind could open the flower—

"The coy Anemone, that ne'er uncloses
Her lips, until they're blown on by the
wind."

It is called *Windröschen* (little wind-rose) by the Germans. It is widely distributed in Asia, prized by the Chinese, a great favorite in Europe, Canada and the United States.

Aneroid. See Barometer.

Angel′ico, Fra (the angelic), a Dominican monk and the most celebrated of early Italian painters, was so called because of the beauty of the angels and saints he painted. He never would take money for his pictures, and always prayed before commencing a picture. His *Coronation of the Virgin* is in the Louvre at Paris. His era is 1387-1455.

Angell, James Burrill, LL. D., American educator and diplomat, was born at Scituate, R. I., January 27, 1829. A graduate of Brown University, he afterward traveled abroad and returned to take the professorship of modern languages at his alma mater. In 1866, he became president of the University of Vermont, and five years later exchanged the post for that of president of the University of Michigan, resigning the office in 1909. In 1880-81 he acted as United States minister to China, and later he negotiated for the government some important treaties. He was American minister to Turkey and served on international commissions, especially on those dealing with Canadian-American fisheries and deep waterways. He died in 1916. His *Reminiscences* and *Selected Addresses* were published in 1912.

Angell, James Rowland, American educator, son of the preceding, was born at Burlington, Vt., May 8, 1869. In 1890 he was graduated from the University of Michigan, and from 1894 to 1919 he taught at the University of Chicago, where he headed the department of psychology after 1905 and was acting president 1918-19. In 1919 he became president of Yale, in succession to President Hadley.

Angelo, Michael (*mī′ka-el ăn′jā-lō*), an Italian sculptor, painter and architect, was born near Florence in 1475. (The great painter's name is frequently written as one word—"Michelangelo" or, in Italian, "Michelagnolo Buonarroti"). He began to draw as soon as he could use his hands, and his early paintings on the walls of the house where he lived as a boy were once shown. A great merchant prince, Lorenzo del Medici opened a garden in Florence filled with statues. Here Angelo went often to draw, and his first piece of sculpture, a copy in marble of a laughing faun, so pleased Lorenzo that he took the boy into his own house, treating him like a son. His *Sleeping Cupid* brought him to the notice of all Italy, and got him an invitation to come to Rome. Here, besides other statues, he carved his Pieta, the mourning Mary with the dead Christ in her lap, now in a chapel of St. Peter's. From now on his life was of the busiest. A huge block of marble, 18 feet long, lay outside the cathedral at Florence. One sculptor had hacked at it and half spoiled it, but out of it Angelo cut his statue of *David*. The pope gave him an order for a tomb, and Angelo's design was so magnificent that it was decided to rebuild St. Peter's as a fit covering for it, and Michael Angelo was made the architect. The Sistine chapel was to be ornamented, and in 20 months the great painter had covered the whole ceiling with the beautiful frescoes that may be seen there today. It was on the walls of this chapel that he afterward painted his *Last Judgment*. Michael Angelo was a poet, and wrote beautiful sonnets;

and also an engineer, and built the fortifications of Florence. Besides possessing genius, he had a passion for work. He carved till his hands could no longer guide a tool, only giving up his work at the age of 90, when he said, "Death often pulls me by the coat to come with him." He died in 1564.

Angiosperms (*ăn'jĭ-ō-spermz*). One of the two divisions of seed plants, or *Spermatophytes*, the other being *Gymnosperms.* It is the highest and most recent great group of plants, and to it belong almost all the plants of ordinary experience. The group contains over 100,000 described species, and at the present time furnishes the chief vegetation of the earth's surface. To it belong all the true flowering plants, as well as the plants directly useful to man. The bodies of angiosperms are exceedingly varied in size, habit and duration. They range in size from no larger than the head of a pin to the giant redwood; in habit, from floating and creeping to erect; in duration, from a few weeks to centuries. The name refers to the fact that the seeds are inclosed in a case, and are not freely exposed as in the *Gymnosperms.* The two subdivisions of angiosperms are the *Monocotyledons,* to which grasses, lilies, palms, orchids, etc., belong; and the *Dicotyledons,* to which the common trees, buttercups, roses, mints, sunflowers, etc., belong. For a further account see MONOCOTYLEDONS and DICOTYLEDONS.

An'glo=Sax'on, the name of the German tribes that invaded England just after the Romans had left it. They came mostly from three tribes, the Saxons, Angles and Jutes, all living on or near the Danish peninsula. They subdued and overspread the country, driving the Britons, who were of the Celtic race, before them. They founded the seven kingdoms, Kent, Sussex, Wessex, East Anglia, Mercia, Essex and Northumbria, which were banded together for protection into the Heptarchy or Seven Kingdoms, and afterward united in one nation, called England, from the Angles. Each of the seven divisions had its king and a queen, who were treated with great respect. Next came the athelings or high nobles; then the thanes, who were landed farmers. Below these were the churls, who were retainers of the thanes, and lowest of all were the slaves, most of whom had been prisoners of war. The Anglo-Saxon language is the German language spoken by these tribes, mixed with a few words of Celtic spoken by the Britons and many Latin words introduced by the monks, who were the only scholars then in the country. Although the English language grew out of the Anglo-Saxon, we cannot read it now without studying it like a new language.

Ango'la, a Portuguese colony on the west coast of South Africa, in lower Guinea. It has an area of 484,800 square miles; population, 4,119,000. It was discovered by the Portuguese in 1484, and is still in their possession. The capital is St. Paulo de Loando. An army of 5,000 men, four war vessels and the cost of maintaining the packet service eat up almost the entire revenue of the colony. The country has a coast line, between the mouth of the Congo and the Damaraland region of 1,000 miles; the boundaries separating it from the Congo Independent State and from French and British possessions in southwestern Africa have been adjusted by conventions made between the nations involved. Angola is divided into six districts: Congo, Loando, Benguella, Mossamedes, Huitla and Lunda. It has a large export trade in coffee and rubber, besides ivory, cocoa nuts, vegetable oils, oxen and fish. But while rubber trees were abundant they have, in many districts, been destroyed by the wasteful methods employed in gathering the sap. Angola also has valuable lumber trees, including the immense tacula with blood red wood.

Angola abounds in the wild animals you see in the circus menagerie and the zoo—the lion, leopard, cheetah, elephant, giraffe, hippopotamus, zebra, ostrich and crocodile.

Angora, an inland town in Turkey south of the Strait of Bosporus which suddenly sprang into life when the Turkish Republic established its capital there following the World War. Previously, Constantinople was the capital. The Turkish government built many public buildings, cleared the streets, and established sanitary conditions. The population is 40,000. The region is the original home of the Angora goats. The province of Angora surrounds the city, and its 27,370 square miles contain over a million inhabitants. Mohair, Angora wool, and cereals are principal exports.

Angora Goat. See GOAT.

An'gus, Richard B., of Montreal, capitalist. Born near Edinburgh, 1830. Came to Canada in 1857 and joined the staff of the Bank of Montreal. In 1861, placed in charge of the Chicago agency. Later local manager at Montreal and in 1869 general manager. For ten years he achieved brilliant success in this position. In 1879 he retired to take the position of general manager of the St. Paul, Minneapolis and Manitoba Railway. In 1880 he was one of the Stephen (afterward Lord Mount Stephen) Smith (Lord Strathcona) syndicate, which built the Canadian Pacific Railway, which was completed in 1885. This was the leading incident in a phenomenally successful career. He is a governor of McGill University, president of the Board of the Royal Victoria Hospital and a director of the Bank of Montreal; possesses a valuable art gallery; and is one of the most prominent of successful Canadians.

Aniline (*ăn'ĭ-lĭn* or *lēn*), a colorless, oily and poisonous liquid, discovered 80 years ago as a product of the dry distillation of indigo, but now mainly derived from the benzene of coal-tar. It is largely used in the manufacture of dyes, now an extensive industry since the development by chemists of the variety of aniline and coal-tar colors and their application in dyeing and calico printing. On exposure to air and light aniline takes on a dark red color, and it boils at 183° C. United with acids, it forms crystallized salt.

Animal'cula. See PROTOZOA.

Animal Kingdom, the name applied to the group containing all animals, separating them from the vegetable and mineral kingdom, respectively. It is a very old arrangement to divide all nature into three kingdoms—animal, vegetable and mineral. Cuvier named one of his most famous books, the *Animal Kingdom* (*Règne Animal*), and in it divided animals into four divisions, based on their plan of construction, as follows: *vertebrata*, the backboned animals; *mollusca*, the soft-bodied animals, such as snails, clams, etc.; *articulata*, all jointed animals, thus including lobsters and crayfishes with the worms; *radiata*, animals like the starfishes, sea anemones, etc., having a radial arrangement of parts. These divisions have long been out of use, for the reason that they do not represent the real state of the case. The animal kingdom is now divided into a larger number of branches, called sub-kingdoms. While there is a tendency to increase the number, the following eight sub-kingdoms represent a modern arrangement. 1. Protozoa, the simplest animals, microscopic and single celled. All animals above the protozoa are many-celled, and are spoken of collectively as metazoa. 2. Porifera, the sponges. 3. Cœlenterata — the jellyfishes, hydroids, sea anemones, coral animals, etc. 4. Vermes, the worms, a very large and complex group, including the jointed worms, leeches, earth worms, the smooth worms, the shelled worms, like brachiopod shells, etc. 5. Echinodermata, animals with spiny skins, like starfishes, sea urchins, sea cucumbers, etc. 6. Arthropoda, the articulated animals, with jointed limbs—spiders, insects, myriapods, crustacea. 7. Mollusca — snails, oysters, clams, cuttle-fish, etc. 8. Vertebrata: this group includes some of the animals formerly classed with the worms and mollusca. The majority of them have a backbone composed of vertebræ, but not all of them. The sub-kingdoms are coordinate divisions; in other words, equivalent groups. They are further divided into Classes, the classes into Orders, the Orders into Families and smaller divisions. On account of the importance of the Vertebrata, the five Classes are named: Fishes, Amphibia, Reptiles, Birds and Mammals. See the different sub-kingdoms under their respective headings.

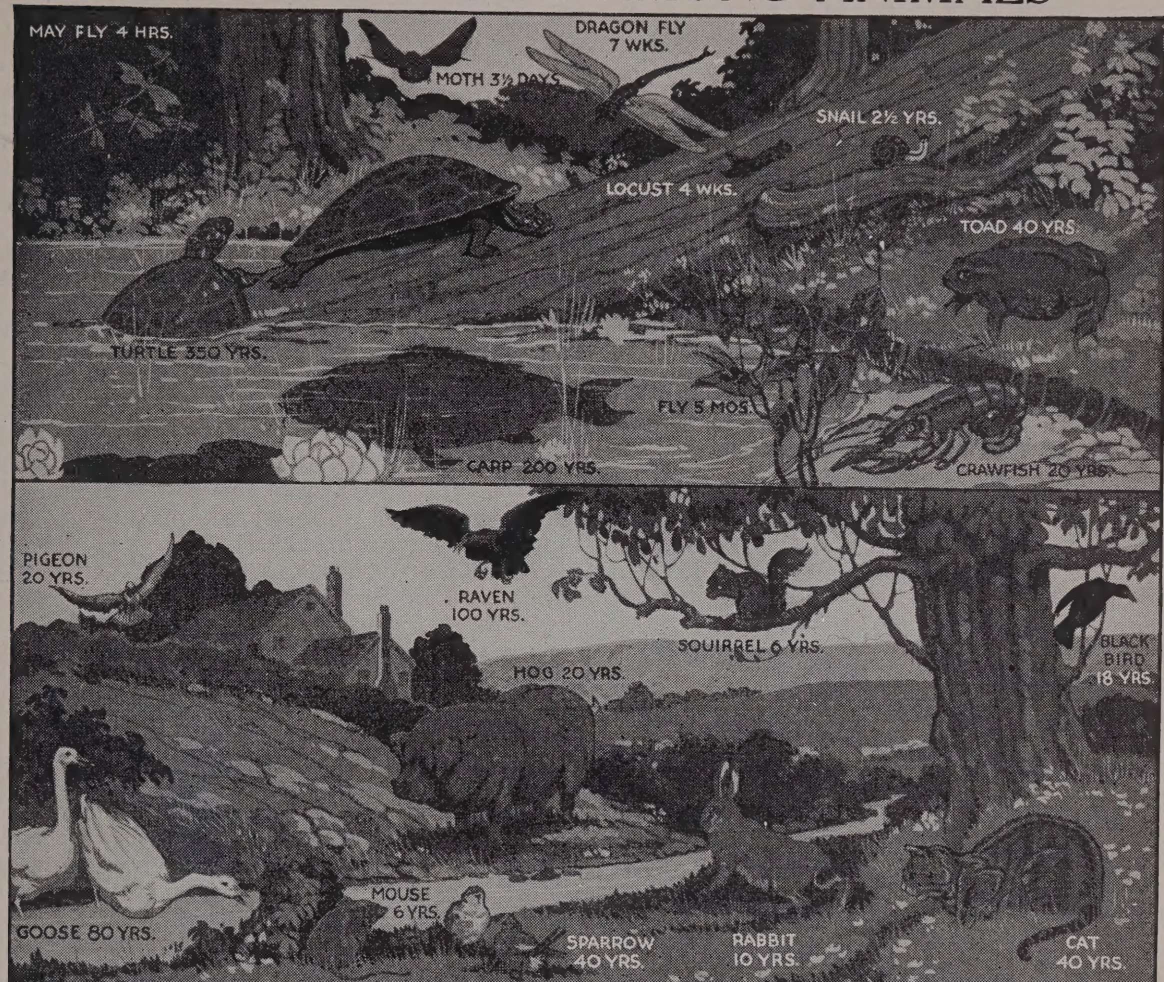
Anjou (*än-zhōō'*), an ancient province in the northwest of France, area about 3,000 square miles. In the 12th and 13th centuries it was a possession of the English kings, and from it came Godfrey, Count of Anjou, who, in 1127, married Matilda, daughter of Henry I of England, and so became the ancestor of the Plantagenet kings. In 1480 it reverted finally to France, in the reign of Louis XI.

Anam', a country, forming part of the peninsula of Indo-China, bordering on the China Sea, and lying between the Gulf of Siam and the Gulf of Tonquin. It is flanked on the west by Siam and on the north by China. Today, it forms, with Cambodia, Tonquin and Cochin-China, the chief Asiatic possession of France. It has an estimated population of 6,124,000, and an area of 52,100 square miles. It was acquired by France in 1884, and the affairs of the protectorate are under the control of the French government. Three of its ports are open to European and American commerce. Its exports include, besides rice and raw silk, sugar, cinnamon and medicinal plants. Hué is the capital with a population of 50,000. See COCHIN CHINA.

Annap'olis, a picturesque old seaport is the capital of Maryland, and the seat of the United States Naval Academy. The city is on the Severn River, two miles from Chesapeake Bay. It was first settled in 1649 as Providence, it became the state capital in 1694, and in 1708 the town was renamed in honor of Queen Anne. In colonial days Annapolis was one of the foremost of American cities, and became known as "The Athens of America." The Continental Congress sat there from November, 1783, to June, 1784; General Washington there resigned his commission as commander-in-chief of the Continental Army, December, 1783; and in September, 1786, representatives of five of the states assembled in the Annapolis Convention for the purpose of promoting the commercial interests of America. This convention recommended the calling of another, and the recommendation resulted in the Constitutional Convention of 1787, which devised the constitution of the United States. The United States Naval Academy, founded in 1845, has been located at Annapolis since its organization. The city is also the seat of St. John's College, established in 1789, and St. Mary's Seminary. Population, 14,000 .

Annapolis or Annapolis Royal, formerly Port Royal, is the county seat of Annapolis County, Nova Scotia, situated on Annapolis Basin, opening from the Bay of Fundy. It is the oldest European settlement in America to the north of Florida, having been founded by De Monts and Champlain in 1604. It has an estimated population of 1,105 the county containing about 20,000 souls. The ruins of the ancient fortress, still imperial property, are of interest, but there are no remaining proofs of the early

LENGTH OF LIFE AMONG ANIMALS



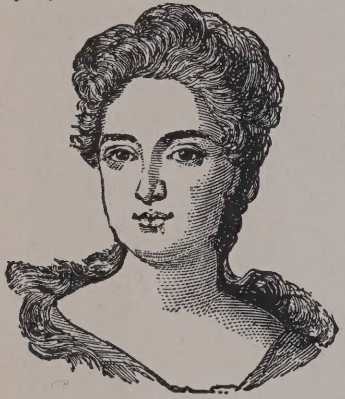
MAY FLY 4 HRS.
DRAGON FLY 7 WKS.
MOTH 3½ DAYS
SNAIL 2½ YRS.
LOCUST 4 WKS.
TOAD 40 YRS.
TURTLE 350 YRS.
FLY 5 MOS.
CARP 200 YRS.
CRAWFISH 20 YRS.
PIGEON 20 YRS.
RAVEN 100 YRS.
SQUIRREL 6 YRS.
BLACK BIRD 18 YRS.
HOG 20 YRS.
MOUSE 6 YRS.
GOOSE 80 YRS.
SPARROW 40 YRS.
RABBIT 10 YRS.
CAT 40 YRS.
GOLDEN EAGLE 104 YRS.
PARROT 100 YRS.
WHALE 500 YRS.
BEAR 50 YRS.
ELEPHANT 150 YRS.
LION 35 YRS.
SWAN 150 YRS.

One of the most interesting things in the study of animals is the length of life of which they are capable. A May fly, for example, born at 1 o'clock, is approaching old age by 4, and by 5 has passed away; while a whale who saw Columbus discover America might still have been spouting until near the end of the 20th Century. Insects, fortunately, are short lived; otherwise, life would be pretty hard for all the rest of us. But other small creatures, you notice, are quite long lived. A saucy little sparrow, for instance—if nothing happens to him—could keep chattering at you off and on from the time you learned your first baby words until you reached middle age.

French occupancy. It was named from Queen Anne on its capture by the British in 1710, and was ceded to the British Crown in 1713. See NOVA SCOTIA.

Ann Arbor, Mich., an important town and railroad center, the county seat of Washtenaw County, situated midway between Detroit and Jackson on the Huron River. It is the seat of the University of Michigan, University School of Music and the Ann Arbor High School. This latter institution supplements or prepares its students for the University and its enrollment embraces pupils from all parts of Michigan and of the United States as well as foreign countries. It has many important manufacturing concerns, mills, machine shops, etc. Population, 25,000.

Anne, queen of England from 1702 to 1714. She was born near London in 1665, was the daughter of James II, and married Prince George of Denmark. She came to the throne at the death of her brother-in-law, William III. During her reign occurred the War of the Spanish Succession, in which the Duke of Marlborough won his famous victories. The union of England and Scotland under the name of Great Britain was made while she was queen. Her reign is known as the Queen Anne age of literature, because of the many illustrious writers of the period: Addison, Pope, Dryden, Swift, Defoe and the great scientist, Isaac Newton. Though the mother of 17 children, Queen Anne left no heirs, and was the last sovereign of the house of Stuart.


QUEEN ANNE

Anne Boleyn. See BOLEYN, ANNE.

Anneal'ing, the process of tempering certain metals and glass to increase their tenacity and render them less brittle by cooling them slowly after they have been submitted to a high temperature of heat. Badly annealed glass, it is well known, will break with a sudden change of temperature, and to obviate this glass vessels are annealed in trays in a long oven, one end of which is hotter than the other—the process of annealing being to draw the trays slowly into cooler and cooler portions of the oven. Cast iron is similarly annealed for tinning; while steel and other metals are tempered after much the same process is undergone. The annealing of the softer metals is done by immersion in boiling water, which is then slowly cooled.

An'niston, Ala., a progressive city, the county seat of Calhoun County, situated in the Blue Ridge chain of mountains. It is located on the Southern, Louisville and Nashville and Seaboard Air Line railroads about 62 miles east by north of Birmingham. Its exports include coal, iron, cotton and lumber; and its industries, coal and iron mining and the manufacture of soil pipe, cotton yarn and cloth, table linen, hosiery, frogs and switches, car wheels and locomotives. Its educational institutions include excellent public schools, an Episcopal school for girls, a Presbyterian College and Barber Seminary for colored girls. Its many beautiful churches include the noted St. Michael and All Angels. Population 20,000.

An'nuals. Plants which endure only a single growing season. See DURATION.

An'nulus. A structure developed in the wall of the spore-case (*sporangium*) of the ordinary ferns to assist in discharging the spores. See FILICALES.

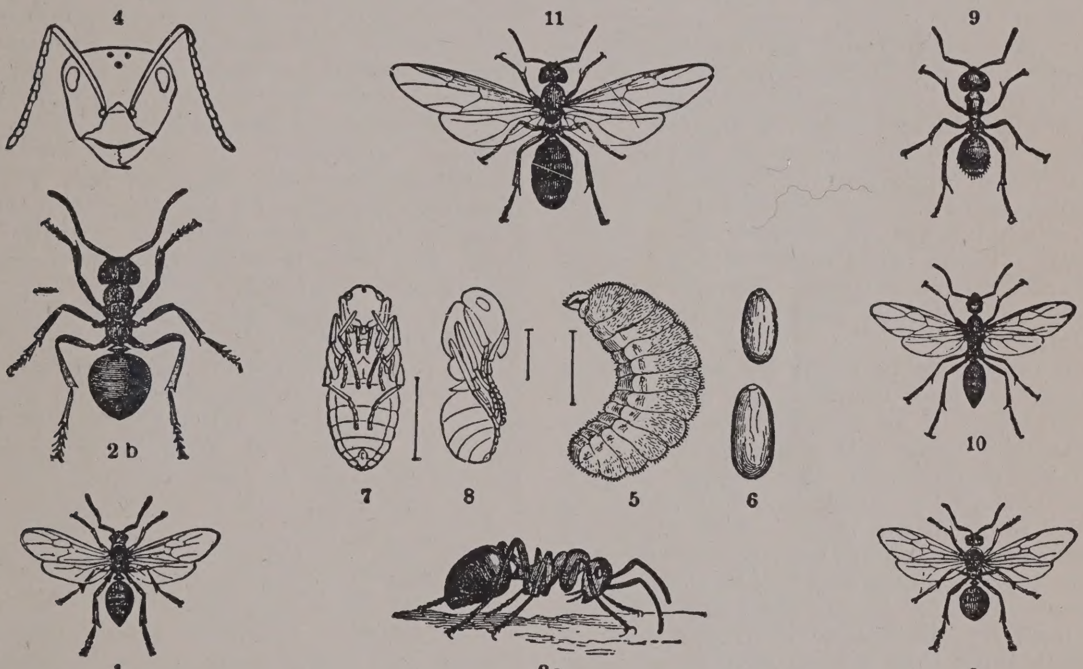
An'selm, Archbishop of Canterbury, was born in Piedmont in 1033. He studied at Bec in Normandy and became renowned for his learning. He was elected abbot of Bec in 1078, and in 1093 was chosen archbishop of Canterbury in England. Anselm quarreled so fiercely with the king, William Rufus, in regard to the relation of church and state that he was exiled from England. He was recalled by Henry I with whom the quarrel was continued. The controversy was finally settled by a compromise. The king permitted the bishops to be elected, though the election was to take place at his court. The rights of the crown were secured by the act of homage on the part of the bishops when they received their lands; the spiritual rights of the church were recognized by the anointing of the bishops by the archbishop and their investiture with ring and crozier at his hands. Papal jurisdiction was not excluded, but no papal legate could come into England without the king's permission. Anselm was the author of many books on theology and philosophy. He died in Canterbury in 1109, and was buried there.

Anso'nia, Conn., a city of New Haven County, on the Naugatuck River, near the city of Derby and the junction of the Naugatuck with the Housatonic River. It is on the line of the N. Y., New Haven & Hartford railroad, about 12 miles west of New Haven. It has a number of manufactories, chiefly of brass and copper products, clocks, electrical works, webbing and knitting goods, carriages and hardware. Ansonia was founded in 1844 by Anson Greene Phelps, and the public library of the city was erected to his memory by his granddaughters. Population 20,000.

Ant, an insect related to bees and wasps. More than two thousand species have been described. One authority thinks there are probably as many as 5,000. All ants are social, and live in communities, old ones containing hundreds of thousands of members. Ants of one community are not friendly with those of another; either they have nothing to do with them or quarrel with them. The work of a community is wonderfully portioned out. There are big workers and little workers. In some species there is a class that does the fighting, a soldier class. In a colony are the females, which are largest in size: the males; and the workers or nurses, which are the smallest.

After the pairing season the males are allowed to stray away and soon die. The females and workers are very long-lived. The queens are carefully guarded by the workers, but occasionally one of them escapes and founds a colony. There are four stages in the life history of ants: egg, larva, pupa and perfect insect. The eggs are laid by the queen and carried about by the workers or nurses, exposed to the sunlight during the day and protected from the dampness at night. As soon as the white, legless larvæ are hatched, they are treated in the same way, being fed by a liquid from the stomach of the nurse, until they reach the proper age to spin their own cocoons around them. The cocoons represent the pupa stage; they are commonly called ant-eggs, and are carefully tended by the workers. When ready for their second birth, the young ants are cut out of the inclosing cells.

The workers are the most interesting of the three classes of ants. Besides acting as nurses, they supply all the food and are the builders of their wonderful colonies with their houses and streets, by processes of mining, masonry and carpentry. The mining ants dig long galleries in the clay, removing the rubbish, building pillars to support the work and covering the whole with a thatch of grass stems. The red and yellow field-ants are the masons. They first raise pillars and then spring arches over them, covering them with the loose piles of soil which we know as ant-hills. The carpenter ants bore their cells in the solid timber of trees, side by side, with partitions no thicker than paper. A kind of ant in Australia builds its houses of leaves fastened together with a kind of glue. Ants are very strong, carrying animals for food, or masses of material several times larger than themselves. They eat various kinds of food, both vegetable and animal, other insects, honey, sugar, fruit, etc. They are fond of the honey-dew produced by little insects called aphides, and some kinds of ants capture these insects and use them as milch-cows. Many ants live on decaying vegetable and animal matter. In some hot countries are large, flesh-eating ants, which move in swarms over the land, searching for insects of all kinds, each carrying his prey. In South America, when a swarm is seen approaching, the people leave their houses and let the ants clear out the insects which infest them. In Texas is a kind of farming ant, which is said to plant, cultivate and harvest a kind of grain, laying it up in cells



Red Wood Ant. 1 Male. 2 a and b, Worker magnified. 3 Female. 4 Worker's head. 5 Larva. 6 Shelter of Pupæ, so-called ant-house. 7 and 8 Pupæ magnified.
Horse Ant (natural size). 9 Worker. 10 Male. 11 Female.

for a rainy day. This kind also "builds paved cities, constructs roads and keeps a large military force."

Some varieties, like the amazon or warrior ant, are slaveholders. They go out on warlike expeditions against tribes of smaller ants and capture their eggs and cocoons, which they bring home, dooming the ants hatched from them to lifelong labor.

The honey ant is a very curious creature, having a distended abdomen filled wholly with honey. Active workers bring in the honey, and it is stored with the honey-bearers. These cling to the ceiling of the underground chambers, and in time of need give forth their store drop by drop.

The common household ants are the little red ants, the small black ant and the pavement ant. Their nests, usually in walls, are very hard to locate. Their presence can be discouraged by spraying with kerosene the crack through which entrance is had to kitchen or pantry.

There are various kinds of ant homes. Some have underground chambers and galleries, some occupy chambers and galleries in decaying wood. Some ants construct mounds. Some build nests of a paste-like substance. In the tropics there is a great variety in materials used and manner of building.

The only insects likely to be mistaken for ants are the termites or white ants, which belong to an entirely different order of insects. These latter live in vast communities, generally in the tropics, and do much damage by eating out the interior of articles of furniture, chairs, tables, sills of houses, etc. They are very productive, one female laying as many as 80,000 eggs. Their homes are very large, sometimes twelve feet high, in the shape of a cone, and so strongly built that a man may stand upon them. The queen is imprisoned in a large chamber in the interior.

Ants have been a most interesting object of study from the earliest times; reference being made to them in the Bible and in poetry and fable. Many stories are told of their seeming intelligence, much written of the curious features of their lives — their battles, their mushroom-growing, the many guests they entertain in their colonies, the cleanliness of their homes, etc., etc. See Lubbock: *Ants, Bees and Wasps;* McCook: *The Agricultural Ant; The Honey Ants* and *Tenants of an Old Farm;* Howard: *The Insect Book;* La Fontaine's fable: *The Grasshopper and the Ant.*

Antæus (*ăn-tē'ŭs*), in ancient fable, a giant of Libya, son of Neptune and Terra. He was a mighty wrestler and could not be conquered so long as he remained on and was in contact with the earth. Whoever came to Libya had to wrestle with him, and with the skulls of the slain he built a temple to his father Neptune. Hercules finally conquered him by lifting him from the ground and strangling him in the air.

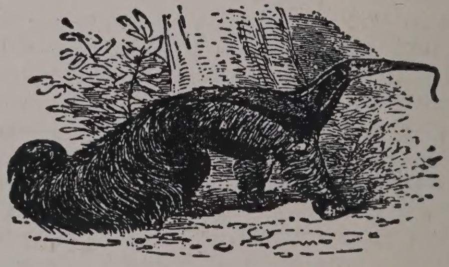
Antarc'tic, meaning opposite to the Arctic or northern pole.

Antarctic Circle is one of the smaller circles of the globe, twenty-three and a half degrees from the south pole.

Antarctic Ocean, is the name of the ocean lying within the Antarctic circle. It was long thought impassable for ships on account of the ice, but of late years many voyages have been made and tracts of barren land observed. The features of the Antarctic Ocean are constant fogs and currents, unnumbered icebergs and the beautiful *aurora borealis* (which see).

Antarc'tic Exploration. Since the notable expedition in 1840, to the South Polar Seas, of Captain James Ross and Dr (Sir Joseph) Hooker in the Erebus and Terror, there have been several researches in the region. In 1901–4, Captain R. F. Scott (*q. v.*) carried Britain's flag to 82° 17′ S., although preceded by Amundsen. Other expeditions embrace those of the German Antarctic Expedition (1901–03); the Swedish Expedition in the Antarctic, which was lost; and the Scottish-National Antarctic Expedition (1902–04) in the Scotia. A notable expedition was that of Lieutenant Shackleton, who sailed from England in Aug., 1907, and reached latitude 88° 23′, Jan. 9, 1909. It remained for Roald Amundsen (*q.v.*) to win the long-sought prize. Sailing from Norway in 1910, he wintered in Whales Bay, and in Oct., 1911, started with a dog and sledge outfit for the south pole. Climbing the ice barrier to the great polar plateau and struggling over the polar plain, he reached the pole Dec. 14-17, 1911. See also Polar Exploration.

Ant-Eater, a toothless animal found in Central and South America feeding on white ants and other insects. The long, flexible tongue, covered with sticky saliva, is protruded among the insects and suddenly withdrawn when a number have collected upon it. There are a number of forms The great ant-eater is about four feet long with a large tail covered with bushy hair. The color is gray, marked by a band of black on the breast and toward the shoulders; the feet and forelegs are white. The claws are long and strong, adapted for digging. It sleeps a great deal, and lies curled up with its



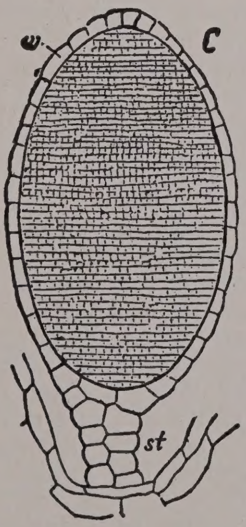
ANT-EATER

tail spread out to protect it from sun and rain. In defending itself, it makes good use of its strong forearms.

An'telope, an animal like the deer, belonging to a group between cattle and goats. Its horns are ringed and hollow and are not renewed annually The size varies greatly, the pygmy antelopes of South Africa being only from eight to nine inches in height, while the largest kinds are from five to six feet. Antelopes are found in Europe, Asia, Africa and America. They are the fleetest as well as the most beautiful and graceful of quadrupeds. Two kinds are peculiar to North America—the Rocky Mountain goat, which is a true antelope, and the prong-horn. The latter stands apart from the true antelopes, from the circumstance that annually it sheds the outer sheath of its horns. There is an interior bony core that remains permanent. These animals are distributed from the Missouri River to the Pacific and from 53° N. latitude southward into Mexico. At one time there were immense herds in the San Joaquin Valley in California. They are now abundant in northwestern Mexico. The common antelope is found in India and Eastern Asia. It is about two and a half feet high at the shoulders, with erect diverging horns bent in a spiral form. It is so swift that grayhounds cannot catch it, and it leaps easily a height of ten or twelve feet, while the length of its bound is often ten or twelve yards. The Chinese antelope is found in the deserts of Central Asia. Its flesh is very much prized. The gazelle of North Africa was known to the ancients, its beautiful black eyes being often spoken of by Arabian poets. In the Alps we find the chamois and in South Africa the eland, the largest of all the antelopes.

Anther (*ăn'ther*). That part of a stamen which produces the pollen. See FLOWER.

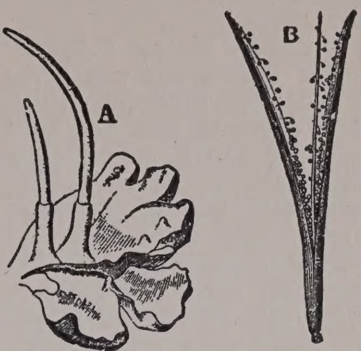
Antheridium (*ăn'ther-ĭd'ĭ-ŭm*). The male organ of plants. Within it are produced the sperms or their equivalents, which fertilize the female cells or eggs. The antheridium varies in structure in different groups of plants, being for the most part a single cell in the *Thallophytes*, and a several to many-celled structure in the higher groups. It is important to note that the antheridium holds no relation to the anther, the structure in the flower which produces pollen, for the anther is not a male organ. To avoid this confusion it has been proposed to change the name antheridium to spermary.



SECTION THROUGH ANTHERIDIUM OF LIVERWORT

Antherozoid (*ăn'ther-ō-zō'ĭd*). A name often applied to the swimming or motile sperm of plants. See SPERM.

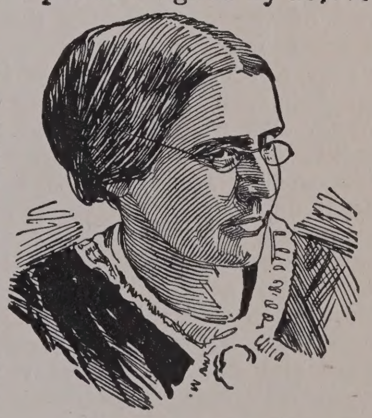
Anthoceros. A genus of the plants known as liverworts which gives name to the group *Anthocerotales.* The group contains but few forms, but is of great interest from the fact that from it the mosses seem to have developed, and possibly the ferns and seed-plants also. The body (gametophyte) is a simple flat thallus, and produces a slender spore-case (sporophyte) which is remarkable for its continued growth in length and its green color. See HEPATICÆ.



Anthoceros, showing thallus with two capsules (A) and mature capsule splitting (B)

Anthony, Henry Bowen, American statesman, was born at Coventry, R. I., April 1, 1815, and died at Providence, R. I., September 2, 1884. Graduating at Brown University, he took early to journalism, and was for a time editor of the Providence *Journal.* In 1849-50 he was governor of Rhode Island, and, nine years later, he entered the United States senate, and was a member of that body until his death, serving frequently on important committees, and acting on several occasions as temporary president of the chamber.

Anthony, Susan Brownell. In 1854 a school teacher appeared in Albany, New York, to present a petition signed by 28,000 persons for better laws to regulate the liquor traffic. A member of the Assembly said: "Who are all these signers—nobody but women." Nobody but women—mothers, wives, daughters, sisters who wanted to protect their protectors against evil habits that threatened the home. The teacher, as she turned away, said: "A woman's name on a petition will never be as good as a man's until she has a vote." Susan B. Anthony from that day was an equal suffragist. That thought was her whole creed, precept and practice. For



SUSAN B. ANTHONY

the next half century she gave every day, every dollar, every power of her mind to the work of making a woman's name worth as much as a man's.

Born in South Adams, Mass., February 15, 1820, of a Quaker father, she was given the same education as her brothers, which was unusual in that day. It was not until she began to teach for $10 a month in a position for which a man would have been given $40 that she felt the disadvantage of being born a girl. Her voice was first heard in a New York State Teachers' Association in a demand for equal pay for men and women. At the age of 27 she joined the movement for temperance reform, and she might have preceded Miss Willard in the leadership of that work but for her experience at Albany. She became convinced that the ballot was the only effective weapon to fight with against any and all kinds of moral evil and legal oppression.

Other eminent women were pioneers in this movement, but Miss Anthony was the most original and aggressive of them all, and she was singled out for ridicule. In time her wit, her good-humor, her courage, her intellect, her grasp of political history and the legal status of women won respect and admiration even from people who did not agree with her. There are few to-day who will deny the debt that women owe to her in their privilege of working at innumerable occupations, with equal or very nearly equal pay as men, in their control of their property and children, in their opportunities for higher education and in the fact that women's names on petitions even before they won the franchise, could no longer be dismissed with contempt.

It must be remembered that the cause Miss Anthony made her own was helped along enormously by the Civil War. The roll of the dead forced thousands of timid women into the ranks of bread-winners. From a social disgrace it suddenly became an honor, a patriotic duty for women to work, and necessity opened all the gates of industry and all the gates of preparation for work. Her lectures, her writings, her petitions, her appearance before Congressional committees and her work of organization made her a national character. In 1872 she cast a vote in the presidential election to test her status as a citizen. She was tried before the courts of New York state and fined $100, but refused to pay it, declaring that "taxation without representation is tyranny," just the same as it was a hundred years before. Miss Anthony died March 13, 1906, active and able for her task up to the age of 86. See *Life* by Ida M. Harper.

Anthracite. See COAL.

An'thropol'ogy, a wide and comprehensive term, otherwise expressed as the science of man, and treating of man's nature, origin, history, etc., especially as a social animal, living in groups either by nature or from choice or necessity. Sociology is a term somewhat akin to it, though specifically dealing with society as a whole, its structure and organizations, the laws of its development, as shown in the evolution of man in communities, and of what we know as actual civilization. Again akin to what is termed anthropology is ethnography, which treats of the races of men in the geographical groups or tribes in which they are met; while ethnology deals with the customs, languages, and institutions of mankind in general. Anthropology, in the main, embraces what is usually dealt with in the two latter sciences. The physical aspect and characteristics of the race, varied as they are by climate and temperature, including the cranium, limbs, facial features, height and shape of the body and other descriptive details, belong to the classification of physical anthropology; while the industrial and utilitarian arts in which man employs himself or is employed, together with the tools with which he works, are covered by the term technology. Men in their lawless, vicious state as criminals, felons and outlaws of society, transgressing its laws and defying its proprieties and conventionalities, are studied and treated of under criminal anthropology, by investigators in police offices and prisons, who endeavor to set forth the hereditary, congenital and other causes that create the criminal classes and leave the imprint of crime upon them as a distinct physiognomical and racial type.

An'thropom'etry, the science of the measurement of the human body, is of use in the study of different races of men and also of special groups, such as school-children and even criminals. It is of service also in medicine both for the purpose of a more exact knowledge of the symptoms of disease and for the more reliable use of measurements of the average rate and variation of the circulation of the blood, respiration, etc. It is not only necessary to have these measurements in large numbers; but to have them under different conditions. Francis Galton of England was perhaps the pioneer of the science of anthropometry. It was only in 1875 that measurements of average height, weight, girth of chest, etc., were ordered to be made for the British Association. In connection with education, the measurements by Galton, Karl Pearson, Cattell, Edward Thorndike and others are worthy of notice. Many such measurements have been collected by President Stanley Hall in his famous work on *Adolescence* (1908). The system of identifying criminals by means of thumb-marks and other physical measurements is an example of the application of anthropometry in another field. Physical statistics are often collected by the doctors in charge of large gymnasiums. But scientists now endeavor to measure mental as well as physical traits; and although such measurements are indirect, they represent a greater degree of exactness than mere opinion.

An′ticos′ti. An immense island in the Gulf of St. Lawrence, 140 miles long by 30 miles wide. Not suitable for agriculture. It is now owned by Menier, the French chocolate manufacturer.

Anti=Cyclone. See CYCLONE.

Antie′tam (*ăn-tē′tam*), a creek in Maryland, where was fought one of the great battles of the Civil War, September 17, 1862, between the Union army, with 57,614 men in the field, under General McClellan, and the Confederate, with 38,000 men, under General Lee. The battle raged with great slaughter from early morning until dark. The result was not decisive, the Union loss being over 11,000 and the Confederate loss about 10,000. McClellan did not renew the attack, and on the 18th Lee retreated in safety. But the moral effect was to encourage the north, and on the strength of Antietam President Lincoln issued his proclamation abolishing slavery.

An′tigo, Wis., a city, the seat of Langlade County, on the Spring Brook River and on the Chicago & Northwestern R. R., 206 miles northwest of Milwaukee. Settled in or about the year 1878, the city was incorporated in 1884. Lumbering and agriculture are the chief industries of the region, together with its commercial trade. Besides its railroad shops, it has foundries, flour mills and extensive wooden-ware establishments, etc. Population, 10,000.

Antigone (*an-tig′o-nē*), one of the tragic characters in Greek fable. She was the daughter of Œdipus, king of Thebes. When her father was driven from his throne, she followed him to Attica and cared for him. After his death she returned to Thebes, where Hæmon, son of Creon, the new tyrant of Thebes, fell in love with her. She attempted to bury the body of her brother, who had been slain in war with Creon, and for this offense was ordered to be buried alive or shut up in a cave. Hæmon slew himself by her side. The story of Antigone has been told by several Greek poets; but only the tragedy of Sophocles is now in existence.

Antigua (*ȧntē′gwȧ*), British West Indies, one of a group of islands (the Windward) which compose the Lesser Antilles, situated to the east of Porto Rico and separating the Caribbean Sea from the Atlantic. It is 54 miles in circumference, enclosing an area of 108 square miles or, with its dependent islands of Barbuda and Redonda, 170 square miles in all. Antigua is the seat of government in the Leeward Islands Colony of Britain, and has, besides a nominated governor and executive council, a legislative council consisting of eight official and eight unofficial members. The chief town is St. John (population, 9,262); the population of the colony with its dependencies, 38,899. It has a local telephone line 90 miles in extent, is connected with the West India and Panama Telegraph Company's cable, and is reached by periodic steam vessels, direct from England, New York and Canada. Its chief exports embrace sugar, cotton and pineapples.

Antilles (*ăn-tĭl-lĕz* or *ŏn-tēl′*), a cluster of islands, forming a half circle and generally called the West Indies. They are about 360 in number. They are very fertile, but fierce hurricanes blow over them, and their climate is very hot. Their chief products are sugar, coffee, tobacco and cotton. They are divided into the Windward Islands, the Leeward Islands and the Great Antilles. See WEST INDIES, CUBA, JAMAICA, BAHAMAS, etc.

An′timony, a brittle metal of a bluish-white color. It may easily be reduced to a powder. When heated to about 800° it melts, and when cooled it forms crystals. It burns in the air with a white light, and gives off fumes known as the flowers of antimony. It does not tarnish or rust, and so is much used in alloys, such as type-metal. The finely-divided metal, called *antimony black*, is used to give casts an appearance of iron. There are a number of useful compounds of antimony: tartar emetic, the tartrate which is used in medicine; glass of antimony, a mixture of oxide and sulphide, used for coloring glass and porcelain yellow; and butter of antimony, the chloride, an oily liquid, which, mixed with olive oil, is used by gunmakers to give a brown color to gun barrels. The principal source of the metal is the sulphide, called stibnite or gray antimony ore. It is smelted in France, where it is found abundantly, in Germany and in England which receives its supply from Singapore and Borneo. Antimony is found in America, in California, Nevada, Mexico and New Brunswick.

Antinous (*ăn-tin′ō-us*), a beautiful youth of Bithynia. He was a favorite of the Emperor Hadrian, and went with him on his journey through Egypt. An oracle had told the emperor that a great danger which threatened him could be avoided only by the sacrifice of the person whom he loved most fondly. The youth hearing this, drowned himself in the Nile. In his honor, Hadrian built the splendid city of Antinoöpolis or Antinoë, in Egypt, and also gave his name to a newly-observed star. Antinous was made a god, and statues of him were set up throughout the Roman empire.

Antioch (*ăn′tĭ-ŏk*), named from its founder, Antiochus, was long celebrated as one of the first cities of the east. The name

Christians was first given to the disciples of Christ in this city. It was captured by the Saracens and the Crusaders. Once richer than Rome itself, but devastated by earthquakes and impoverished by conquests, it was finally razed to the ground by the Mamelukes, in 1269. The "Queen of the East," as it was called, is now only a small town.

Antip′odal Cells (in plants). A group of cells developed in the embryo-sac of *Angiosperms*. See EMBRYO-SAC.

Ant-Lion, the larva of an insect common in the United States and belonging to the order *Neuroptera*. The larva is armed with long jaws. It constructs in the sand a funnel-shaped pit one or two inches across. It then conceals itself at the bottom with its pincer-like jaws protruding into the funnel. Ants and other insects slide into the pitfall and are devoured by the larva. The adult form is a graceful insect with four delicate wings and a slender body.

Antonel′li (*ăn′tō-nĕl′lē̇*), **Cardinal Giacomo,** was born in Italy in 1806, and died at Rome, November 6, 1876. He was raised to the cardinalate in 1847, and was for a time secretary of foreign affairs for the papal states. As a champion of the papal interest, he strenuously opposed the union of Italy, under Victor Emmanuel. He was chief adviser and prime minister of Pope Pius IX, and during the Italian revolution of 1848 he accompanied his Holiness in his flight to the seaport of Gaeta.

Antoni′nus (*ăn′tō-nī′nŭs*) **Pi′us,** a Roman emperor, was born in 86 A. D. He was adopted by the Emperor Hadrian and succeeded him in the year 138. His reign was peaceful and prosperous. He is quoted as saying: "I had rather preserve the life of a citizen than destroy a thousand enemies." He encouraged everything that was good, helped the poor, lessened the taxes and well earned the title: "Father of his Country." He was called *Pius* (pious), because he built a temple in honor of his adopted father Hadrian. He died 161 A. D.

An′tony, Mark, a great Roman general, was born at Rome in 83 B. C. He fought bravely as a soldier in Syria, Egypt and Gaul under Cæsar, whose firm friend he became. He took part in Cæsar's great victory of Pharsalia, and with him was made consul in 44 B. C. After Cæsar was killed, Antony, with Augustus and Lepidus, formed a government called the Triumvirate, which defeated the republican army of Brutus and Cassius at Philippi. Some time after, Antony visited Greece and Asia, and met the beautiful Cleopatra, queen of Egypt. His love for her made him forget the provinces he was to govern. When at last he turned his attention to them, he ruled so much like a despot that Augustus sent an army against him, which defeated him in the naval battle of Actium, Cleopatra cowardly sailing away with her ships, and Antony too much in love to stay behind her even to fight for his honor. Soon afterward Mark Antony killed himself (30 B. C.).

An′trim, a county and town in the northeast of Ireland, noted for its extensive manufactures of linen. The capital of the county,—which, as it was largely colonized from Scotland, is preponderatingly Protestant—is Belfast. Antrim is an old town, with considerable historic interest attached to it. Near it, in the reign of Edward III, a battle was fought between the English and the Irish; and, during the troubles of the year 1798, a British force encountered, at Antrim, a body of rebellious "United Irishmen," and defeated them. The county of Antrim has an area of 1,211 square miles, with a population of 478,603.

Ant′werp, the main seaport of Belgium. Its cathedral is a fine specimen of Gothic architecture. The paintings in it are by Rubens; among them is his best work, *The Descent from the Cross*. Antwerp is over a thousand years old. It is to-day the chief military arsenal and the principal commercial city and seaport of the kingdom. The province of the same name (Antwerp or Anvers), has an area of 1,093 square miles, with a population of 825,156. At the beginning of the 16th century the city was at the height of its prosperity, with a population of over 200,000, a world-wide commerce, and 2500 ships at a time in its harbor. The citadel, built by the Duke of Alva, has endured many sieges, notably one of 13 months in 1584-85. Antwerp was held by the Germans from Oct. 8, 1914 to the end of the World War. Population, 310,000.

Apa′ches (*ä-pä′chāz*), a tribe of Indians that inhabit Arizona, New Mexico and parts of Mexico. They are the most treacherous and bloodthirsty of Indians, and live by hunting and robbery. They have no single chief. By a system of mountain signals they can gather at short notice a large body of warriors.

Ape, the name often applied to any monkey, but here confined to the tailless, semi-erect forms that most nearly approach man in structure. This includes the chimpanzee, orang-outang, gorilla and the gibbon. They are all inhabitants of the old world. The term man-like ape applied to these forms is significant of their likeness in structure to man. In fact, man differs structurally from these apes no more than they differ among themselves. It requires some anatomical knowledge to appreciate the differences. Those in the brain are often referred to, but even in that organ it is largely a difference in size, in convolutions and microscopic structure. The convolution containing the brain-cells that preside over speech (convolution of Brocca) is deficient in the apes, and there are, of course, other differences. The likeness is especially strong in the young animal.

An interesting contribution to the facts bearing on the subject of structural resemblances was the finding of a fossil form more man-like than any previously discovered. In 1894, there was found in the island of Java remains of a fossil ape (*Pithecanthropus erectus*), which, from the capacity and form of the cranium and the anatomy of the long bone of the leg, occupies a position intermediate between man and living apes. The doctrine of evolution does not teach that any existing ape is in the direct line of man's ancestry, but that the simian line and the human line are united in remote generalized ancestors common to both groups. The existing apes are, therefore, side branches, as it were, of the ancestral tree and not in the direct royal line. The apes are progressing in their habits; some of them build rude shelter, use clubs and stones in defense, etc., but a popular misconception should be corrected—their progress is not directly toward humanity, but toward a more perfect simianity. Apes live mainly on vegetable food. They are as large as, or larger than, man; all can walk as man does, though more at home in climbing. They have no tail and no cheek pouches, have great strength and intelligence. They are by nature very savage, and are among the most dangerous of wild animals. See CHIMPANZEE, ORANG-OUTANG, GORILLA.

Apelles (*ā-pĕl'ēz*), a Greek painter, who lived probably between 352 and 308 B. C. We do not know when or where he was born, nor when or where he died, and not one of his pictures remains, yet his name stands for the highest excellence in painting. He painted portraits of Philip and Alexander, who would sit to no other painter. His most famous picture was *Venus Rising from the Sea.* One of his paintings, representing Alexander holding a thunderbolt, was sold for a sum equal to $200,000. When he had finished a picture, he used to place it in a public place and hide behind it, to hear what was said. Once he overheard a passing shoemaker say that a slipper on the foot of a figure had not ties enough. Apelles corrected the mistake. The next day the shoemaker began to find fault with a leg, when Apelles, putting out his head, desired him to confine his criticism to the slipper.

Ap'ennines, a chain of mountains in Italy, running the whole length of the peninsula, from the Maritime Alps to the Straits of Messina, a distance of 800 miles. Its average height is about 4,200 feet; its highest peak, Monte Corno, is 9,542 feet. Between the main range and the Mediterranean extends a chain called the Sub-Apennines, which include the group of volcanoes of which Mt. Vesuvius is the center.

Apet'alous Flowers. The phrase literally means "flowers without petals," but it is somewhat arbitrarily applied. In a complete flower there are two distinguishable floral envelopes—calyx and corolla. In case there is only one floral envelop, it is assumed that the corolla (petals) is missing, and the flower is said to be apetalous. The apetalous condition may be a primitive one, or it may have been derived by reduction from forms which had petals. Apetalous flowers are most common in what are regarded as the more primitive families of *Angiosperms.* The noun form of the word is apetaly.

Aphides (*ăf'ĭ-dēz*), small insects very injurious to plants and commonly called plant-lice. The number of species is very large, and they live on a great variety of plants. They are usually greenish in color, with short bodies and long slender legs. Their mouth parts are formed into a short stylet, through which they suck the juices of plants. They prey practically upon all cultivated plants, and increase so rapidly that were it not for their numerous enemies plant life would almost be destroyed. The grapevine phylloxera is very destructive to vineyards; a great pest is the root-louse of the apple, mistakenly called the American blight; another great pest the hop plant louse; and others, the aphides of the cabbage, potato, bean, apple, pear, etc., have carried wide destruction. They are produced in large numbers, and have natural enemies, like the larvæ of the lady-bird. Tobacco and a strong solution of soap and kerosene emulsion are used in combating them.

Many forms of aphide produce a sweet liquid, called honey-dew, of which ants are very fond. Ants are known to keep herds of them as "milch cows" in captivity, protecting them from their enemies and stroking them with their antennæ in order to make them give up the honey-dew.

Aphrodite (*af-rō-dī'tē*), the Greek goddess of love, the counterpart of Venus in Roman mythology. Both, probably, are of Asiatic origin; though it is to the Greeks that we owe the pretty story of her birth from the sea foam and of her subsequently becoming the wife of Hephæstos and the mother of Cupid. By another account, Aphrodite is said to be the daughter of Jupiter and Dione. Beautiful herself, she was endowed with the power of conferring beauty; and as the queen of beauty she was awarded the golden apple of Paris.

A'piary, a house or structure for keeping bees, from the Latin *apis*, a bee. Differences of opinion exist as to the best form hives should take and of what material they should be constructed. Among old-country bee-keepers, the old dome-shaped straw *skep* is still preferred; others prefer a box-like wooden hive, consisting of a breeding-chamber below and two sliding removable chambers above for the abstraction of the honey without disturbing the bees. The one essential on which all agree is that the apiary should be erected in the vicinity of good feeding grounds, such as gardens, clover-fields or heath-covered hills. See BEES.

Apocarpous (*ăp′ō-kär′pŭs*) **Flowers.** The carpels of a flower may remain distinct from one another and thus form simple pistils, or they may organize together in the formation of a compound pistil. In the former case the flower is apocarpous, in the latter it is syncarpous. An apocarpous condition is regarded as more primitive than a syncarpous one. The noun form of the word is apocarpy.

Apogamy (*ȧ-pŏg′ȧ-my*). In plants with regular alternation of generations (which see) the gametophyte produces the sporophyte by means of a fertilized egg. Occasionally the sporophyte is produced directly upon the gametophyte without the intervention of an egg, and such a phenomenon is known as apogamy. In general, therefore, apogamy refers to the appearance of the embryos of higher plants without any sex act.

Apollo, called also Phœbus, one of the chief gods of the Greeks. He was born on the island Delos, and was the son of Jupiter and Latona. He is the god of the sun, the god of song, the head and protector of the muses, the revealer of the future—especially at his temple at Delphi—the god of flocks, the archer who inflicts vengeance with his arrows and the patron of the healing art. He is pictured as a beautiful youth with long hair, his brows bound with the leaves of the sacred bay tree, and bearing the lyre or the bow. The Romans adopted him from the Greeks, and built a temple and held games in his honor.

Apollo Belvedere (*bĕl′ve-dẽr*), a marble statue of the god Apollo, one of the most famous works of ancient art. It was found in 1503 in the ruins of ancient Antium and placed in the gallery of the Belvedere in the Vatican at Rome. The sculptor is unknown, but is thought to be one of the Greek sculptors, either Agasias or Praxiteles. The statue is seven feet high and shows the god in the perfection of manly beauty, at the moment of his victory over the monster Python. He stands with his left arm extended, holding the bow, while his right hand, which has just left the string, is near his hip. The body is poised with such grace as to give it a wonderful beauty.

Apos′pory. In plants with regular alternation of generations the sporophyte produces the gametophyte by means of asexual spores. Occasionally gametophytes arise directly from sporophytes without the intervention of a spore, and such a phenomenon is known as apospory. Both apogamy and apospory have been most commonly observed in ferns.

Apostles, originally the twelve men whom Jesus chose to preach the Gospel. They were Simon Peter (called also Cephas and Bar-jona), Andrew, James the Elder (son of Zebedee), John his brother, Philip, Bartholomew (Nathaniel), Thomas (Didymus), Matthew (Levi), James the Younger (son of Alpheus), Thaddeus, Simon and Judas Iscariot. Matthias was chosen in the place of Judas, and later on Paul and Barnabas were added to the number. The apostles were first sent out by Jesus to preach to the Jews only; but a short time before his ascension they were commanded to preach to all nations. On the day of Pentecost they received miraculous gifts and began their public ministry. They have left records in the *Epistles* and the *Acts of the Apostles*.

Apothe′cium. In plants, a flat or cup-like spore-producing body formed by the *Ascomycetes*, which see. The name is most commonly applied among the lichens.

Appala′chian Mountains. See ALLEGHANIES.

Apperception. This term was originally used by Leibniz (1646–1716), a German philosopher. He wished to distinguish between consciousness and self-consciousness. Ordinary perception makes us aware of external objects, but not of our own perceptions as distinct from what we perceive. Leibniz employed the word apperception to indicate the consciousness of perception. This self-consciousness, he thought, is not possessed by the lower animals, but only by human beings. The brute perceives, man apperceives, or perceives that he perceives. The philosopher Kant (1724–1804) used the term apperception to mean the power of the mind to relate to various perceptions and especially to organize them into a system. The result of apperception, according to him, is that the objects of perception are all seen to belong to one world, to be governed by its laws and thus to be related to each other, and all the perceptions are seen to belong to various minds, by which they are organized, and by the laws of which they are controlled.

Herbart (1776–1841), another German philosopher and psychologist, still further modified the definition of apperception by conceiving it to be the process by which old experience assimilates or gives meaning to new perceptions. This view emphasizes the fact that the character of one's previous experience will determine whether he will be interested in any new object sufficiently to attend to it, that is, to apperceive it. Moreover, the new object that one attends to will seem significant and interesting in accordance with the richness of the experience that he has already acquired in reference to similar objects. Indeed, different people may apperceive the same thing in very different ways and yet all find it interesting. To illustrate these points, suppose a person in crossing a stream sees what looks like a small dull, yellow stone. It does not differ much from the other stones surrounding it, and if the observer does not know enough about that sort of an object to make it more interesting to him than its neighbors, it will not arrest his attention. Suppose, however, that the observer is a savage, who has noticed such stones before, and that they are unusually heavy, and therefore valuable as missiles, such a person would get from seeing the stone a number of suggestions connected with warfare or the hunting of wild animals, and be sufficiently interested to pick it up and carry it away. But if a civilized man were to perceive that the object is not an ordinary stone, but a nugget of gold, his interest will become intense because of his knowledge of its use as money and in the arts. He will not only pick up the nugget, but will do so eagerly. A great number of ideas will surge into his mind, and it may be some time before he will think of anything except his discovery and its significance. Moreover, his actions will be very extensively modified by the experience. If he happens to be a miner, he may perceive in the nugget the suggestion of a rich deposit of gold in the neighborhood, and the current of his life may be turned by its discovery.

It is evident that apperception means alike to Leibniz, Kant and Herbart the interpreting of perceptions by the mind. Leibniz saw in this a process of reflecting upon and becoming conscious of our perceptions. This is, no doubt, one phase of the process of apperception. Kant noticed that this interpreting of perceptions consists in relating and organizing them, and here, too, is an important part of the truth. Herbart brought out the fact that the relating of experience consists in the suggesting of old experience by new perceptions and that its organization means the interpretation of the new perception by the knowledge thus called up. The active force in apperception is, with Herbart, experience itself, and not, as with Kant, a mind that is thought to organize experiences which are themselves passive.

The consequences on education of this view of Herbart are very important. Learning, *i. e.*, apperception, is commonly regarded as absorbing new facts and organizing them so that they may be useful. According to Kant, the teacher might be supposed to present the facts, but their organization must be left to the activity and inclination or will of the pupil. The Herbartian notion of apperception, on the other hand, makes the teacher responsible in a measure for the activity displayed by the learner in assimilating or interpreting the new experience. For the successful apperception of a new object depends upon two things: first, whether the learner already possesses any experience with which to interpret it; and second, whether the new perception comes in such a way that it calls up this interpreting experience. Both of these conditions the teacher can understand and at least partially control. He can, before he presents a new topic, investigate what the child already knows about it. This will tell him whether the child can apperceive the topic at all and, if so, to what extent and in what way. If the child already possesses a fund of apperceiving material sufficient to make the topic profitable, it may be presented. The method of presentation, however, will depend on what the child already knows. This is brought out in a preparatory step. Such a preparation brings all or the most valuable part of the related experience possessed by the child actively to bear on the new idea, thus insuring its apperception. It also gives the teacher his clue as to what the child can learn, and what he needs to learn in order to complete his view of the subject. Later, as the new subject becomes better mastered, the teacher can suggest the connections between it and other related subjects—thus increasing the degree of organization of material in the pupil's mind. Finally, the ideas thus mastered can be continually revived at the suggestion of the teacher in order to interpret new material or solve new problems. Thus the idea of appreception can have a very decided influence upon this method of instruction.

From the point of view of the course of study also, the notion of apperception is of the greatest importance. For it implies that each subject as a whole be selected with reference to the child's particular stage of development; that it be so graded that the work of every day prepares for the next; and that all the subjects be so correlated that the growing knowledge of each shall constantly redound to the benefit of all.

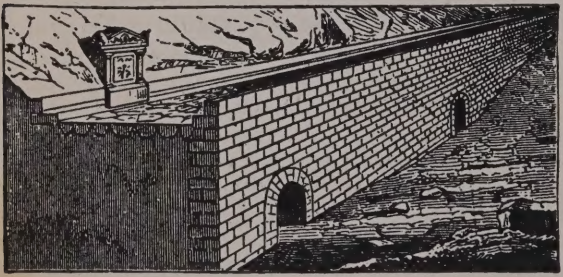
The idea of apperception has in recent years received a new development because of the discovery that what causes new subjects to be seized and assimilated by the mind is not merely that they are seen to be related to familiar experience, but that their mastery is felt to be worth while. To use the illustration employed earlier, the savage is interested in the nugget and apperceives it, because he sees that he can make use of it in a very fruitful way. The intenser apperception of the civilized man is due to the great value that gold has for him in the social world he inhabits. From this point of view the teacher is seen to have the task of not merely connecting the new object with familiar experience but also that of helping the child to see how, in the light of his experience, the comprehension of the new topic is worth while. To get the observer to apperceive the nugget properly, it may not only be necessary to tell him that it is that familiar thing, gold, but to get him to see how valuable a thing it is to know about and to possess. To be sure, experience would be the only source of this valuation. Yet the child may need help to get from experience the values that will inspire him to enlarge his experience and power along specific lines. Thus, through a proper utilization of his experience the savage might be led to see the value that gold has for civilization and so to apperceive it quite differently. In this aspect apperception is very intimately related to *Interest*.

Some psychologists now use the term apperception to cover all that the mind adds to what is at the moment given by the senses. In this meaning it signifies the interpretation by the mind, not of perception, but rather of sensation. Perception itself is a gradual outgrowth of experience and therefore involves apperception. This use of the term leads to no important educational consequences that are not involved in the other.

See ASSOCIATION OF IDEAS, INTEREST, TEACHING, METHOD OF, MENTAL DISCIPLINE, PSYCHOLOGY FOR TEACHERS.

Consult *Apperception*, Lange; *General Method* and *Method of the Recitation*, McMurry; *The Educative Process*, Bagley; and *The Point of Contact in Teaching*, Du Bois. E. N. HENDERSON.

Appian Way, a famous road with many branches which connected Rome with southern Italy. The main road was laid out by Appius Claudius (312–307 B. C.). It was paved with large and well-fitting blocks and adorned with numerous magnificent sepulchers, the most noted being those of Collatinus and the Scipios. Within the present century excavations have been made over a large part of the ancient road.



CONSTRUCTION OF PORTION OF APPIAN WAY

Apple, the name of a tree and of the king of fruits, the most important commercial pomological fruit in the world. It will grow in a variety of climates and soils; in the Old World its range is from Scandinavia south to the mountainous portions of Spain; in the New World, from New Brunswick to the mountains of Georgia, from British Columbia down to the mountains of Mexico. And in New Zealand and Tasmania the apple thrives. It has been in cultivation since prehistoric times. Notable reference is made to it in ancient literature; it is mentioned several times in the Bible; in the tale of Troy's fall the apple played a part; names and other evidence shows its extensive cultivation by the Romans; the folk-lore of Scandinavia and Germany abounds with stories of apple trees and golden apples.

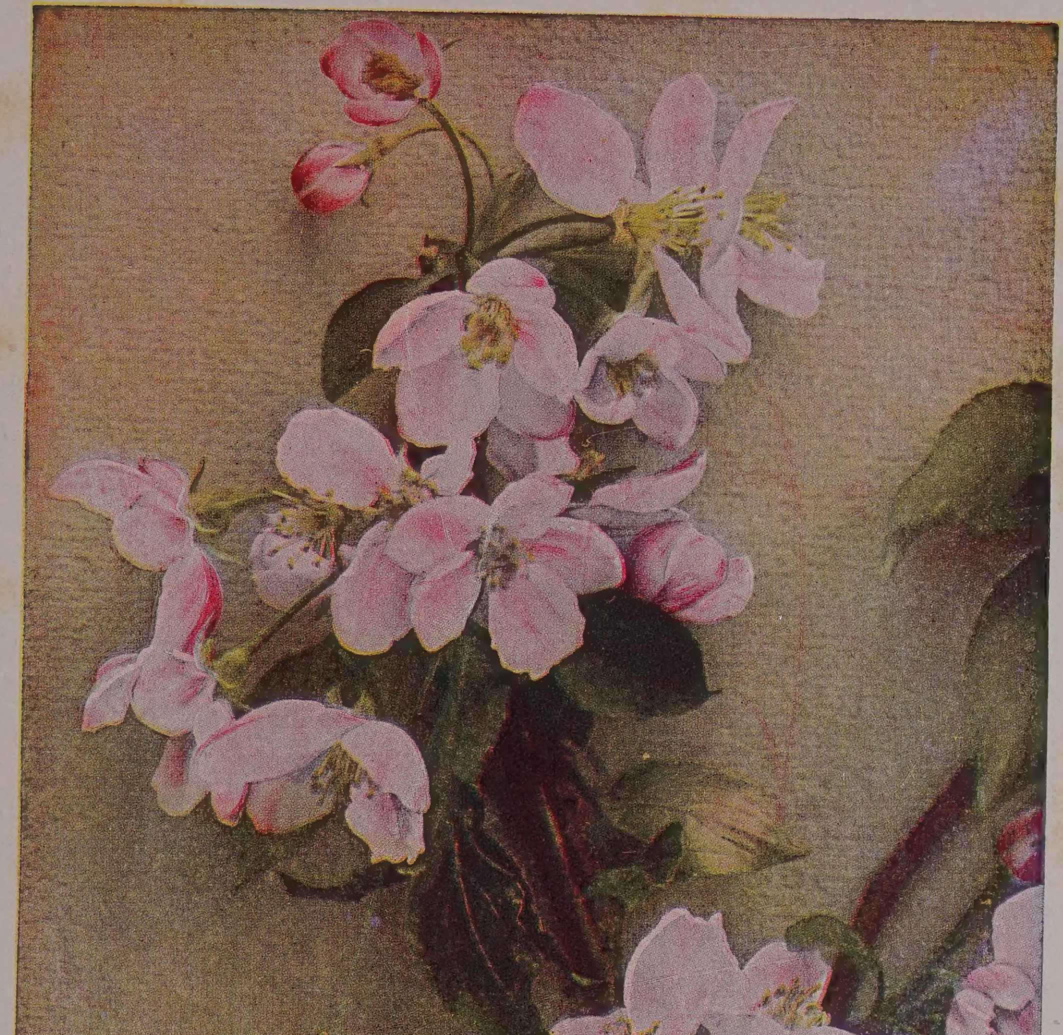
The apple belongs to the rose family of plants, and is a native of southwestern Asia and adjacent Europe. The common apples are all modifications of a single species; while the crab apples have all been derived from another species. The number of varieties actually on sale in America during any year is not far from 1,000 North America is the greatest apple country of the world, and a full crop for the United States and Canada is, in good years, not less than 100,000,000 barrels.

Apples were early introduced in this country, and at first prized specially for cider In the United States the apple is adapted to all portions save Florida, the lands immediately bordering the Gulf and the warmer localities of the southwest and Pacific coast. The most perfect apple region, Bailey considers, begins with Nova Scotia and extends to the west and southwest to Lake Michigan; other important regions are the Piedmont country of Virginia and the highlands of adjacent states, the plains region, the Ozark and Arkansas regions and the Pacific region.

While the apple thrives in a variety of soils, it reaches its best in a clay-loam. It is propagated both by budding and by grafting the sort desired on young seedling trees. Apples grown from seeds are very apt to revert to the wild type. Dread enemies of the apple are apple worm and apple scab. Spraying with poison is the means used to check their work of ruin.

There are several species of crab apple native to North America; the prairie, the wild (*Coronaria*), the narrow-leaved, and the oregon crab. The blossom of the wild crab-apple is of exquisite beauty and fragrance, and thickets of these trees now have place in many of our city parks. There is no wild flower more highly prized in this country, and for every region there is a crab-apple tree.

The common apple tree is rightly valued for its beauty as well as its utility. In the spring, when the rugged, sturdy trunk bears aloft its huge bouquet of fragrant bloom and freshest leaves, all pay homage—and here may be made declaration that



COURTESY OF DEPARTMENT OF EDUCATION, NEW YORK STATE

APPLE BLOSSOMS

beauty is excuse for the wealth of flowers, for not one tenth of the blossoms is needed to "set" all the fruit the tree could mature. A summer orchard, too, is very attractive, and decidedly attractive is the orchard in the season of ripened fruit. In winter the spreading bare branches and leaning tree stand out in full picturesqueness.

"Health to thee, good apple-tree,
Well to bear pocketfulls, hatfulls,
Peckfulls, bushel-bagfulls."

See Bailey's *Cyclopedia of American Horticulture* and Bailey's *Field Notes on Apple Culture;* Thomas: *The Book of the Apple;* McFarland: *Apples.*

Appleseed, Johnny, the nickname of an eccentric character belonging to the early pioneer days of Ohio and Indiana. He looked upon it as his mission in life to start orchards in the wilds, and for over 40 years trudged here and there in the wilderness with his leathern bag of apple seeds. His clothing in later life consisted of a long, loose garment made out of a coffee sack, on his head a cap fashioned of pasteboard. He wore no shoes, but trod barefoot on his long, rough journeys.

His real name was Jonathan Chapman; it is thought he was born in Boston in 1775. He made his appearance in Ohio with his apple seeds in 1801; came again in 1806, this one time travelling by water, his seeds stored in canoes. Ere long he became well known to the settlers and Indians, and was regarded as a friend by both. He would procure his seeds from the cider-presses of western Pennsylvania, then with his load go where the white men were clearing and making homes farther west; selecting a fertile spot near a settlement, he would start a nursery, and when ready for transplanting dispose of his trees to the settlers. Ohio and Indiana owed to Johnny Appleseed many and many a good orchard; he lived to see his trees bear fruit over a territory of great extent.

At the scattered log-cabins old and young were wont to give warm welcome to the strange, kindly wanderer. He seems to have been held in a kind of superstitious awe, the Indians for their part considering him a great medicine-man. During the War of 1812 he saved the lives of many settlers by spreading the news of Hull's surrender and the coming of the Indians. He was extraordinarily gentle and kindly, would harm no living creature, and amid the many dangers of the forest himself remained unharmed. He died at a settler's cabin in Allen County, Indiana, in the summer of 1847.

Appleton, Wis., a city, the capital of Outagamie County, Wisconsin, on the Fox River, about midway between Oshkosh and Green Bay city. The town receives its water-power from the falls here on the Fox River, and utilizes this in the chief factories and industries, such as in pulp-making, paper making, the manufacture of pulp-mill machinery, furniture and woolen goods. Other industries are flour and wind mills, wire works and cement building-blocks. The town has a water outlet by river into Green Bay and Lake Michigan, as well as by rail, 120 miles southeast to Milwaukee and other points. It is the seat of Lawrence College, has two fine libraries, one public and the other in Lawrence College, and a handsome Y. M. C. A. building; also a fine hospital in charge of the Catholic sisters. Population, 22,000

Appomat'tox Courthouse, a Virginia village, 20 miles east of Lynchburg. Here, April 9, 1865, General Lee surrendered the army of northern Virginia to General Grant. Of this army only 27,805 men were left.

Apricot (*ā'prĭ-cot*), a fruit between the peach and the plum, supposed to be a native of China. There are three species. The kind common in Europe and America grows on a spreading tree with round top, luxuriant, beautiful foliage, bark similar to that of the peach, leaves bright green and ovate or round-ovate, flowers of pinkish white. The apricot will grow under much the same general conditions as the peach. It is beginning to be grown commercially in the east, but it is in California it holds leading place. It has been grown there since the early mission-days, and now is one of California's most important commercial fruits. In the east the apricot suffers from the curculio, the insect that works such havoc with peach and plum. In California the enemies feared are scale insects and a slot-hole fungus.

A'pril, the fourth month of the year, containing 30 days. It is named from a Latin word, meaning "to open," because the buds open at this period of the year. Charlemagne, who made a new calendar, called it Grass Month, the name still given it by the Dutch. On old monuments April is represented by a dancing boy with a rattle.

April Fools' Day, the first day of April. The custom of playing tricks and practical jokes on this day is common throughout Europe and America. In France, the man tricked is called a "silly fish;" in Scotland a "gowk." This practice probably goes back to the era of the early Hindus who play the same kind of tricks on the last day of March, when they hold what is called the Huli festival.

Aquarium (*á-kwā'rĭ-um*), a tank for keeping living animals and plants for study and amusement. A proper proportion of plants and animals keeps the water pure, or it may be renewed. There are two kinds, fresh water and marine aquariums. The fresh water ones are more easily kept, as the animals are hardier. A good form is a square tank, about 12 inches deep, with plate glass sides, and metal, slate or marble bottom and a metal frame. The bottom should be covered an inch deep, or more with sand and pebbles scattered over it, and the tank filled with fresh river or spring water. The use of rock work adds greatly to the beauty. Among plants, water thyme, crowfoot, milfoil and starwort, are useful, because they produce a great deal of oxygen. Interesting animals for this purpose are the stickleback, goldfish, tench, gudgeon, perch, minnow and Prussian carp, while mussels and snails are good as purifiers. A salt-water aquarium needs more careful attention, but is built in much the same way. Another form, with three of the sides closed and with an inclined plane for a floor, to allow the more torpid animals easily to reach the surface, has been found very successful. Green dulse or seaweed is a good sea-plant to use, and of animals, shrimps, snails, barnacles, minnows and sticklebacks. Large aquariums have been built in many cities. In this country the aquariums of New York City and Detroit are famous.

Aqueduct (*ăk′wē-dŭkt*), a channel for carrying water, or a structure on which water-pipes are laid. This method of carrying water has been in use from the earliest times. Persia, Phoenicia, Judæa and many other eastern countries practiced it; while the Incas or rulers of Peru in the western world built aqueducts which have not been equaled in ancient or modern times. The Romans were the most expert at aqueduct building of ancient peoples and built these works all over their dominions. Rome was supplied by 24 aqueducts, some with several channels, one above another, extending many miles. They are built on a grade of regular descent, winding around the hills or piercing them by tunnels and supported across low levels by arches sometimes over a hundred feet high. Many cities are now supplied with water by this means.

Other important aqueducts are those used for carrying canals across rivers and valleys. The chief examples in the United States are those on the Erie canal, 32 in number, the Denver aqueduct, of wood, which supplies 16,000,000 gallons a day, the Pioneer aqueduct in Utah, and the Croton aqueduct in New York, which cost over $20,000,000, and required over five years to build.

California has many wooden aqueducts, called flumes, for use in hydraulic mining. Masonry and iron piping are both extensively used for aqueducts, the choice depending upon the contour of the land. As cast iron does not become corroded so quickly as steel, it is more often used, though steel can sustain a greater amount of pressure from within. Concrete is used when the ground is high and the water is to be carried on or near the surface, and when a great volume of water has to be transported.

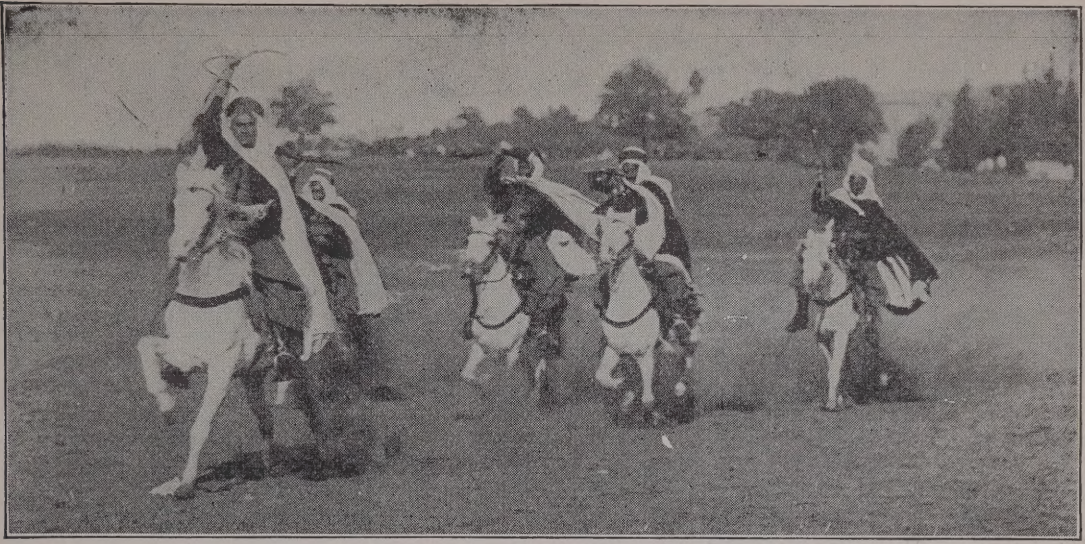
Aquinas (*ȧ-kwī′năs*), **Thomas** (c. 1225–1274), was the greatest of the Christian philosophers of the Middle Ages. He is known as "the angelical doctor" and "the universal doctor." Aquinas, so called because of his birthplace Aquino, in Italy, was a member of the order of Black Friars. His chief work is the *Summa Theologiæ*. His writings were regarded by his followers as almost sacred; and in 1323 he was canonised as Saint Thomas Aquinas. Although he knew little of history and nothing of Hebrew and Greek, the learning of Aquinas was as extensive as was possible previous to the Renaissance. In the 14th century scholars became divided into two great bodies, the Thomists or followers of Aquinas and the Scotists or the followers of the Franciscan writer, Duns Scotus. The doctrines of Aquinas somewhat resemble those of Aristotle, who was known in part to Aquinas in translation, and those of the Scotists are indebted to Plato. The great work of Aquinas was his attempt to bring together scientific learning and Christian doctrine into one complete system.

Ara′bia, an extensive quadrangular peninsula forming the extreme southwest part of Asia, much of the interior of which is an arid, sandy desert. It is situated between 12° 40′ and 34° north latitude and between 32° 30′ and 59° 40′ east longitude.

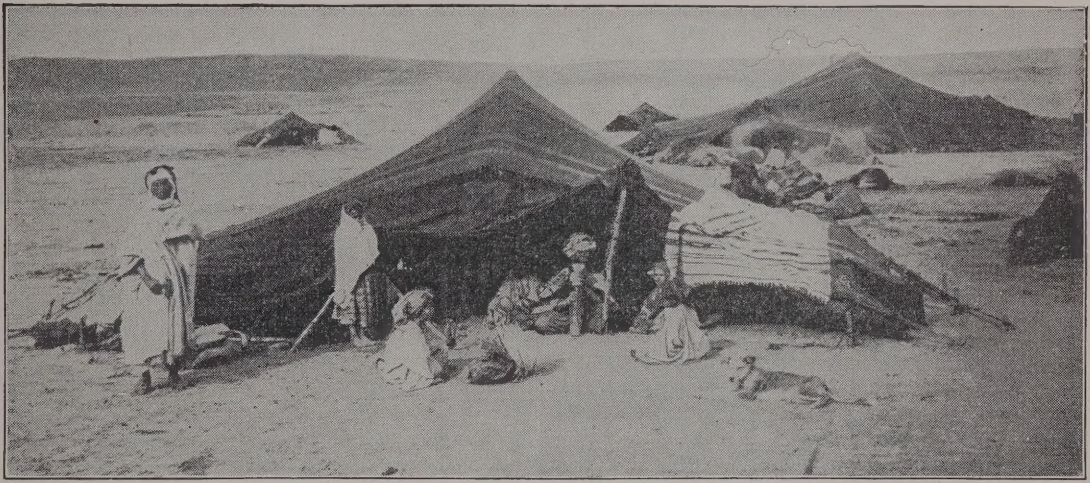
Area. Its length, from north to south, is about 1,500 miles, and its breadth from east to west varies from 800 to 1,200 miles. It is bounded on the south by the Gulf of Aden, the Arabian Sea and Indian Ocean; on the east by the Gulf of Oman and the Persian Gulf, the Tigris River in the northeast separating it from Persia; while its northern boundary is Asiatic Turkey; and its western the Red Sea and Strait of Bab-el-Mandeb. The Sinaitic Peninsula and the Suez Canal on the extreme northwest separate Arabia from Egypt and the continent of Africa. In the southwest the island and fortified port of Aden and that of Perim both British possessions subject to the Bombay (East Indian) Government form excellent harbors and coaling stations. The other harbors (there are not many on the Arabian Coast) include Muscat on the Gulf of Oman, El Kuweit near the mouth of the Tigris, and Dafar (or Dhofar) near the British Kuria-Muria Islands in the Arabian Sea.

Government. The peninsula is politically a dependency of Turkey, and by that power its more settled region, on the Red Sea front, is created into two vilayets or provinces, named Hejas (area, 96,500 square miles, with a population of 300,000) and Yemen (area, 73,800 square miles, with a population estimated at 750,000). In the former (Hejas) the chief port is Jedda, the administrative seat and the

ARAB LIFE IN THE DESERT

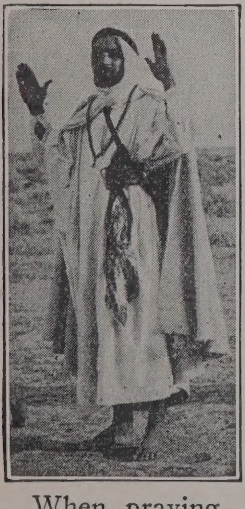


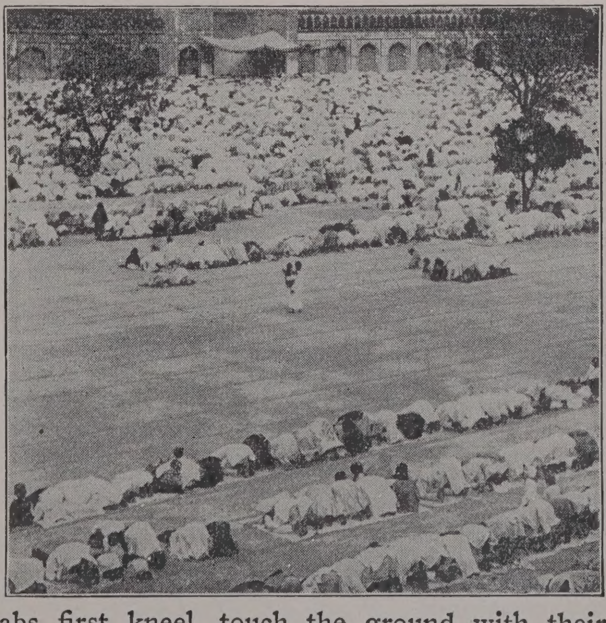
Arabs can ride at full speed on their wonderful horses and, at the same time, aim and fire their guns.



Here is a group of tents in the desert that the Arab child calls "home." Notice how they differ from Indian tents.

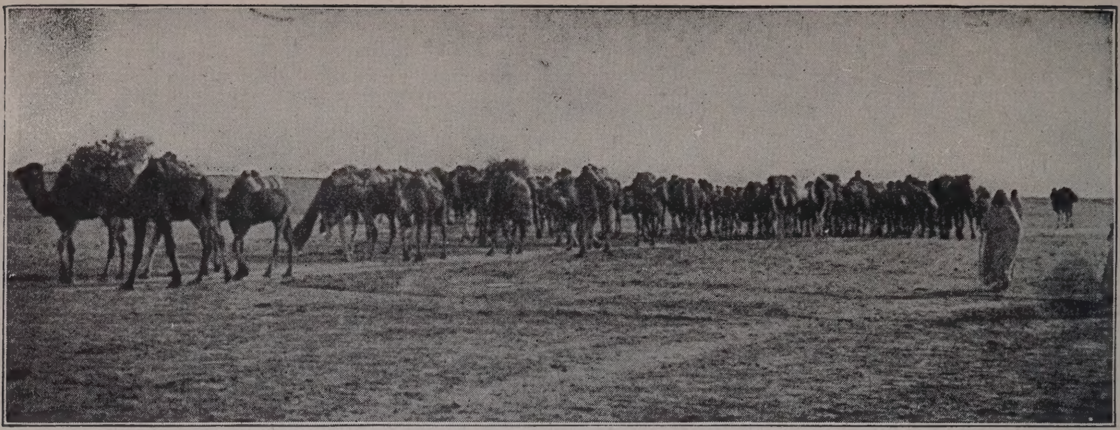
ARAB IN THE DESERT PREPARING TO PRAY



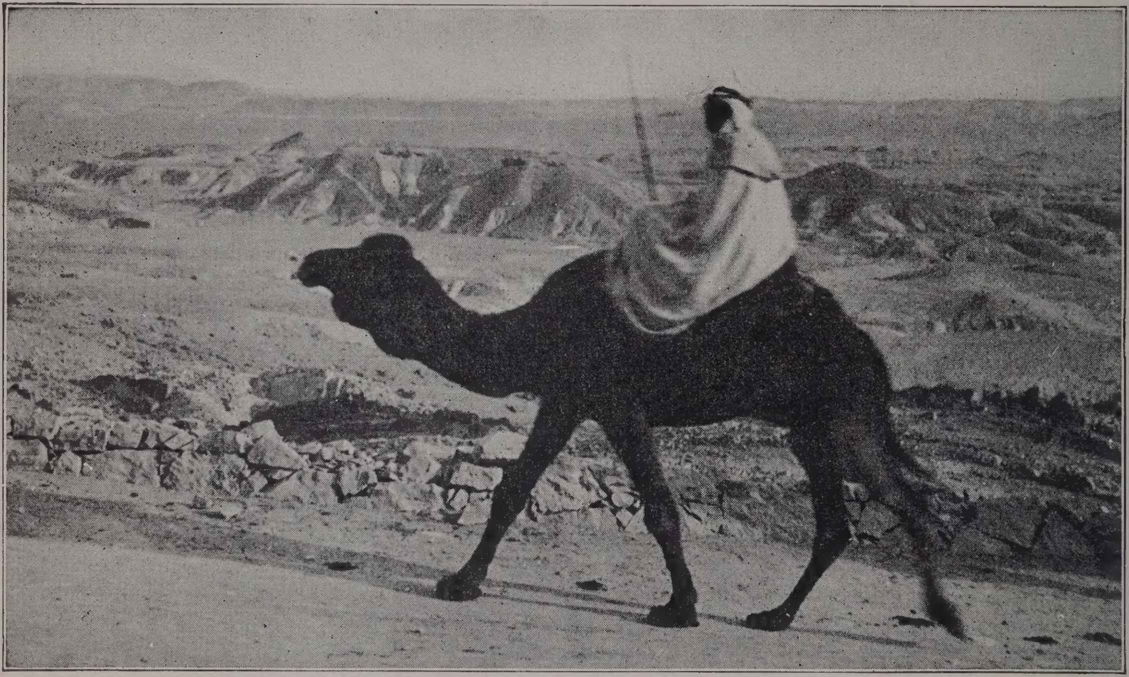


HIS LEG IS TIED, HE CANNOT WANDER

When praying, Arabs first kneel, touch the ground with their foreheads, as these natives of India are doing, then rise with hands uplifted toward Mecca, the birthplace of Mahomet, their prophet. The natives of India are Buddhists.



A FREIGHT TRAIN OF THE DESERT.
A caravan of camels carrying spices, silks, rugs and other merchandise.



A DESERT "LIMITED."
A swift camel speeding his master across the sands.

Photo, Brown Bros.
AN ARAB FAMILY WITH THEIR CAMELS RESTING NEAR AN ENCAMPMENT.

objective point of pilgrims, proceeding from Syria and Egypt on their way to the inland city of Mecca, which is the birthplace of Mohammed and contains the Kaaba, the holy shrines and sacred mosques of Islam. North of Mecca lies Medina, with its Red Sea port of Yambo. Medina, too, has its fine mosques, one of them being erected on the spot where Mohammed died. The capital of Yemen is Sanaa, its port being Hodeida on the Red Sea. South of Hodeida, near the Strait of Bab-el-Mandeb, is Mocha, the seat of the trade in coffee, which is now chiefly exported from Aden and Hodeida. Inland from these two provinces lies the Syrian desert on the north; and on the south, extending for hundreds of miles from Yeman to Oman, are the deserts of El Akhaf and Roba'a-el-Khali.

Surface and Products. Arabia with its extensive tablelands, varied by its vast trackless deserts, has a hot, dry climate, only the coastal plains being fertile and productive. On the latter, browsing on the grassy slopes, are reared donkeys, goats and dromedaries. Besides these, Arabia has many wild animals, the terror of travellers and the menace to the native caravans; among these are tigers, panthers, hyenas and lynxes besides the less repellant and more useful ostriches and gazelles. Among natural resources, in addition to the rice plant, the coffee tree and the date palm, there are many spice and incense shrubs, together with the cotton and maize plants. Gum arabic and precious stones are the chief exports.

History. The Arabs claim descent from Ishmael, and have ever been a wild and independent people of nomadic habits and predatory instincts. Their history proper begins with the advent of the religious enthusiast, Mahomet (570-632 A. D.), and with the foundation of the caliphate. Leaving their peninsula, the Arabs and their caliphs founded large and powerful empires in three continents, which flourished until the close of the fifteenth century, when Arab rule and influence in Europe and Asia Minor came to an end. In the following century the Turks obtained possession of Yemen, and although for a time they were expelled from that Arabian province, they subsequently settled down in the peninsula and obtained at least nominal possession of its holy cities as well as those in the Hejas province. There was great difficulty in the following years, due to the rise and dominance for a time of the Wahabis, a religious sect which sought control of the Mohammedan holy cities and shrines, and menaced the Sultan's interests in the country as protector of the sanctuaries. From the first, attempts were made to end this rebellion, but it took many campaigns from the years 1811 to 1818 before this could be effected by Ibrahim Pasha, acting under Mehemet Ali, Viceroy of Egypt. The Wahabis, despite Turkish sway, still exert a considerable influence in Arabia.

Arabian Gulf. See RED SEA.

Arabian Literature. See LITERATURE.

Arabian Sea, the upper part of the Indian Ocean, situated to the south of Persia and flanked by Arabia on the west and British India on the east. It has two extensions of its waters, northwest through the Gulf of Oman into the Persian Gulf, and southwest through the Gulf of Aden into the Red Sea. The latter, with its connection through the Mediterranean, and the Gulf of Suez, makes the Arabian Sea a great highway of traffic to Bombay and to Madras and Calcutta in the Bay of Bengal. The eastern inlets of the sea are the Gulfs of Cutch and Cambay in northwestern India, where it receives the waters of the Indus River.

Arabi Pasha, (*ȧ-rä'bē pä-shȧ'*), the leader of the Egyptian rebellion of 1882, was born in Egypt about 1835. His father was a farm laborer. He had no schooling when a boy, but afterward learned to read and write Arabic. He was for twelve years a private soldier in the Egyptian army, then rose to be colonel, minister of war and pasha. Previous to his day much money had been borrowed, and the Khédive had promised all Egypt to the bondholders. The people, however, refused to pay the taxes. Hence, England and France interfered, and the Khédive was obliged to fill all positions of trust with foreigners. Arabi now proclaimed to the troops that he was inspired by the prophet to undertake a holy mission, the motto of which was, "Egypt for the Egyptians," and he thus became the leader of a great rebellion. A massacre by his forces at Alexandria soon followed. The English came to the help of the Khédive, and their fleet bombarded and dismantled the forts at Alexandria. The war lasted but a few months, Arabi's army being entirely defeated at Tel-el-Kebir, on September 13, 1882, by the English under General (now Viscount) Wolseley. Arabi soon after surrendered, and was condemned to death. His sentence, however, was commuted to exile for life, and he was sent to Ceylon. In 1901 his banishment ceased and he was made a pensioner of the British Crown.

Arachnida. Scorpions, spiders and mites. See SPIDERS.

Araf (*är'ȧf*) or **Al Araf,** the Mohammedan purgatory. As revealed in the Koran, Araf separates Heaven and Hell, although it is not clear as to who are admitted to Araf.

Arago (*är'ȧ-go*), **Francois Jean Dominique,** a distinguished French astronomer and physicist, and a leading scientist of his time, was born near Perpignan, France, in 1786. At the early age of twenty-three, he had acquired a brilliant reputation by three years of strenuous labor and hardship spent in determining the length of the earth's meridian from Dunkirk to Barcelona. In this work he was assisted by Biot; and from the measures of these two men was computed the distance from the pole to the equator of the earth. Our international standard of length, the *metre*, is one ten-millionth part of this quadrant. In 1809, Arago was appointed to the Paris observatory where he spent the remainder of his life. In 1816 he joined hands with Gay-Lussac in founding the great French journal, *Annales de Chimie et de Physique*. It was about this time that Arago "discovered Fresnel," and made it possible for the latter to carry out his investigations in optics. In this manner Arago, perhaps, did more to establish the wave theory of light than by his own experiments, which, however, were a contribution of no mean order. In 1830, he became director of the Observatory and member of the chamber of deputies. A little later he held, at the same time, the portfolios of minister of war and minister of marine. His lectures on astronomy and his eulogies on deceased members of the Academy of Sciences are models of clearness and elegance. Arago's works are published in 17 octavo volumes. The first of these opens with his *Histoire de ma Jeunesse*, which is already a classic among autobiographies, and should be read by everyone interested in the development of this remarkable man.

Aragon (*ăr'ȧ-gŏn*), an ancient Spanish kingdom, now a district of Spain, embracing the provinces of Huesca, Teruel and Zaragoza (Saragossa), and through which the Ebro and Jalen Rivers flow. It embraces an area of 18,294 square miles, and has a population under a million. It is mountainous, skirted by the Sierras and the highest range of the Pyrenees. Of its many products, the grape and the olive are the finest. Aragon was conquered by the Romans, by the Goths and lastly by the Moors in 714. Later it was governed by its own kings till it became, in 1479, a part of Castile and Leon, by the marriage, in 1469, of Ferdinand and Isabella.

Araguay (*ä-rä-gwī'*), an affluent of the Tocantins, an important river of central and northern Brazil, which reaches the Atlantic through the Para River. Total length, including the Tocantins and the Para, 1,900 miles. In the lower reaches of the river, some 200 miles above Para, the navigation is much interrupted by rapids. About 500 miles from its source, the Araguay incloses the island of Santa Anna, about 210 miles long.

Ar'al, Sea of, next to the Caspian Sea, the largest inland body of water in Asia. It is 265 miles long by 145 miles broad, and is situated in Asiatic Russia. It receives several rivers, but has no outlet. Its waters are salt. It is a remarkable fact that twice, first in the Greco-Roman period and afterward during the 13th and 14th centuries, the present bed of the Aral is known to have become dry, while its rivers flowed to the Caspian.

Aram (*ā'ram*), **Eugene** (born 1704, died 1759), an English felon, born in Yorkshire. He had a good knowledge of a number of languages and became a schoolmaster. A man named Clark disappeared, leaving his debts unpaid, and Aram was tried as his accomplice. It was discovered later that he and another man had killed Clark. Aram made his own defense at his trial, but was convicted and hanged. He is known as the subject of a poem of Hood's and also of one of the novels of Bulwer.

Arap'ahoes, a tribe of American Indians who roamed over the country east of the Rocky Mountains; but chiefly inhabiting Indian Territory and Wyoming. The name is said to signify "tattooed people." They were noted robbers and are very cruel. They number about 5,000.

Ar'arat, a noted mountain of western Asia. It is on the boundary between Persia, Asiatic Turkey and the Russian possessions. It is called by the Persians Koh-i-nooh, or mountain of Noah. The highest peak is 17,000 feet above the level of the sea, or 14,200 above the level of the plain beneath, and is always capped with snow. It is a volcano, and its last eruption took place in 1840. Here, according to the Bible, the ark of Noah rested after the flood.

Ar'auca'nia, the name formerly applied to a part of Chile which is now nearly all included in the provinces of Arauco and Valdivia, lying between the Andes Mountains and the Pacific Ocean. The Araucanians are very warlike, and are so tenacious of their liberty that they maintained their independence for several centuries. They have been much reduced as a nation, and now number only about 50,000. They are humane towards their enemies, and are said to be very hospitable. They are an agricultural people, and give much attention to stock-breeding. In 1861 a French adventurer, Antoine Tounens, was elected king of the Araucanians, but the Chilean government sent him back to France. The Araucanians finally recognized the rule of Chile in 1870.

Ar'bitra'tion, a mode of determining and settling, by reference to outside, independent parties, matters in dispute or disagreement, either in commercial or industrial affairs or in the larger questions of political and international controversy. This may be done by representatives willingly chosen by the respective parties to settle the points of disagreement, or by order of a court of law, when decisions have the conclusive effect of legal proceedings. Arbitration is now being largely adopted in private commercial dealings, especially between masters and workmen; while the resort to the expedient has for many years been employed in cases of international dispute, not involving national honor. (See HAGUE PEACE CONFERENCE.) Arbitration has been successfully employed in settling railroad and labor strikes, wage controversies, lockouts and other industrial troubles. Arbitration in labor disputes took a long step forward in the appointment of the Commission on Industrial Relations by President Wilson under an Act of Congress. The Commission made inquiry into the general conditions of labor, relations between employers and employees, the effect of industrial conditions on public welfare and the like. As one social worker, who helped to secure the Commission, put it: "What we need is more light and less heat." A free copy of its report may be obtained of the Department of Labor.

Arbor Day, a day set apart for the planting of trees, generally observed throughout the United States. It has been established also in Great Britain, France, northern and southern Africa and in Japan. Observance of the day may be said to have started April 10, 1872, the state of Nebraska having the honor of the first Arbor Day, and to the Hon. J. Sterling Morton of Nebraska, belongs the credit of suggesting and establishing a tree-planting day. Kansas began tree planting in 1875, Minnesota in 1876, and gradually the other states followed suit.

Now an important feature of Arbor Day is its connection with the public schools. This connection probably began in 1882, when the school children of Cincinnati, Ohio, planted trees in a public park in memory of authors and statesmen. Soon after this, in most of the schools of West Virginia a special day was appointed for tree-planting. While the festival may be considered a national one, it is observed by the several states and territories at widely different times; in the south it may be observed in December, in the north in May. Some states have a fixed date, in others it is appointed by the governor. In addition to the planting of the trees, appropriate exercises mark the day. The various states issue Arbor Day circulars giving suggestions for the celebration. The value of the interest of the school children in Arbor Day is recognized by the United States Forest Service, which sends out circulars treating of its history and observance. It is desired that every child shall learn of the use and value of the tree in the life of the nation.

Arbutus (*ar'bu-tus* or *ar-bu'tus*), trailing arbutus, mayflower or ground laurel, belongs to the heath family. It is one of the loveliest of our wealth of wild blossoms. The leaf often presents a time-worn and rusty appearance, but the waxy, pink blossoms are of rare delicate beauty and exquisite fragrance. After the spring rains the new leaves come and snow glossy green, the later sprays the finest specimens of both flower and foliage. It is a shy blossom, does not take kindly to transplanting in cultivated garden, prefers the distant pine woods or sandy beach by pine-wood lake. Frequently in moss, too, the arbutus grows, but in moss of sand rather than loam. It is found from the Maine woods south to Florida, abounds in the northern pine forests of the Middle West and is a familiar and beloved flower of New England. It is a brave little blossom; its buds formed the preceding fall, are all ready to come forth while yet another snow storm may be expected. The plant trails on the ground, and the sun on the sandy soil forces the bloom. A few warm days in early spring are sufficient encouragement, and often after the rosy little faces have shown themselves a snowfall will whiten the ground around them. The poet, Whittier, tells of the joy the weary Pilgrims, after their hard winter, took in this early blossom—which abounds in the vicinity of Plymouth—

"Yet God be praised!" the Pilgrim said,
  Who saw the blossoms peer
Above the brown leaves, dry and dead."

The Indians say when there is most moisture the flowers are pinkest, and they do show pallid in a dry season. The stem is prostrate or trailing, some petals quite buried in the sand, no branch high above the ground—one must stoop low to pluck the posies. The flowers grow in clusters, many attached to the woody central stem; they may be gathered in graceful sprays, but by the Indian venders are cut off short and made up into compact little bunches. In gathering the arbutus greediness should be controlled, the plant not uprooted, else, as is the case near the eastern cities, the beautiful blossom will be pushed farther and farther back from town and village, and in the end become extinct.

Arca'dia, a mountainous country of ancient Greece, lies in the northwestern part of the Peloponnesus. In the northeast is the great waterfall of the Styx, which the Greeks thought the main river of the infernal regions. Arcadia seems never to have had immigration from other countries, but was always peopled by the same race, noted for their great simplicity of life. Cut off from commerce divided by the mountains into small districts that had very little to do with one another, the rustic ways of the Arcadian seemed awkward and stupid to other Greeks. Their history is made up of wars against the Spartans. They became a part of the Achæan league, and later of the Roman province of Achaia. Sir Philip Sidney's *Arcadia* greatly praises the Arcadians.

Arch, Triumphal, was a memorial raised by the Romans to celebrate a victory or in honor of a victorious general. Triumphal arches were erected long before the day of Rome's splendor, however, and even to-day in parts of Asia, in China, Cambodia, Egypt, and Siam, ruins of arches erected centuries before Christ are still to be found.

In Rome, upon the return of the victor from battle, it was customary to adorn the gate by which he entered with the spoils of war. In time the custom grew into that of erecting a special arch of bronze or stone patterned after a city gate. The most celebrated of Roman arches are the arch of Augustus at Rimini, the arch of Trajan at Benevento, that of Constantine over the Via Triumphalis near the Colosseum in Rome, and that of Titus on the Via Sacra, also in Rome. The arch of Titus was built by the Romans after his death in honor of his conquest of Judea. It is famous for its bas-reliefs. The Roman arch was round. It was succeeded by the pointed Gothic arch which came into prominence in western Europe. Among the most outstanding arches erected since the days of Roman victors are the Arch of Triumph of the Carrousel in the Tuileries gardens, built by Napoleon I; the Arch of Triumph of the Star at the head of the Champs Elysées, Paris, which was begun by Napoleon I, in 1806, and completed in 1836; the Marble Arch, Hyde Park, London; the Brandenburger Thor at the Unter den Linden in Berlin, which was built by Frederick William II, in 1793; the Dewey Arch and the Arch with Colonnade, both in New York City.

See ARCHITECTURE.

Archæology (*är′ kē-ol′ ō-ji*), the science which deduces knowledge of antiquities from a study of the art, architecture, customs, and beliefs of ancient peoples as disclosed by their monuments, implements, inscriptions, and other relics of their civilizations. By means of exploration and excavation among the ruins of ancient civilizations in the Old World and in the New, our knowledge of the life, habits and customs of many mysterious and interesting nations and peoples has been greatly enriched. The art galleries, museums and archæological institutes of today are filled with myriad treasures of ancient civilizations, revealing to the modern mind the cunning handicraft and artistic taste of these early peoples. Among the specimens unearthed by archæologists are beautiful marbles, mural paintings and costly decorations from Greek and East Indian mausoleums and temples, rare ceramics, mosaics, vases, gems, bas-reliefs, statuary, bronzes and coin mintings, as well as a vast array of personal ornaments, unique household utensils and elaborately figured pottery and relief ware. Valuable discoveries have been made by archæologists in the Graeco-Roman world, ancient Babylonia, Assyria, Phoenicia, Persia, Egypt, Ceylon, India, China and Japan, and in recent years in North, South and Central America.

The past five years have been especially fruitful for archæological exploration. Excavations have been made in Egypt on the site of King Zoser's pyramid at Sakkara near Cairo. Here scientists discovered unknown chambers in the burial apartments under the pyramid itself, filled with oddly shaped vessels of diorite and alabaster. The chambers were all lined with glittering blue tiles.

The British Museum Expedition, under the direction of the Earl of Carnarvon and Howard Carter, a British archæologist, conducted explorations around Assiut, Egypt. Little has been known of this period which ante-dated Egyption civilization. The British Expedition discovered 250 Badarian burials on this ancient site. The discovery of grain among the ruins indicated that these people were undoubtedly agriculturists.

The opening of the chambers in the tomb of Tut-ankh-amen has revealed a vast mass of treasure. One of the most famous Egyptologists of the world, Dr. James Breasted, has enriched the field of archæology through his work especially at the tomb of Tut-ankh-amen. In 1930 the tomb of Ra-Ouer, high priest of Nekheb, was discovered in Egypt. One of the most valuable treasures found in the tomb was a necklace which was made of 40,000 gold beads and tiny pieces of lapis lazuli. During this same year an American expedition was busily occupied at Meidum in clearing one of the largest mastabas, which were tombs built in the time of the Memphite dynasties. One of the most interesting discoveries made by this particular group of archæologists was that of a huge red granite sarcophagus. At about this same time the Italian Mission excavated about the site of El Gebelen, the ancient city of Hathor, while a French expedition succeeded in unearthing tablets which revealed a hitherto unknown alphabet of twenty-eight letters.

For the past twelve years an expedition from the University of Pennsylvania, co-operating with the British Museum, has been conducting excavations in Mesopotamia. Such work has been chiefly centered about the site of ancient Ur of the Chaldees. In the early part of 1934 this expedition, under the director, Dr. C. Leonard Wooley, unearthed an alabaster statue which has been dated approximately 3200 B.C. The statue is about ten inches in height, carved in alabaster in two pieces, and is undamaged except from the decay of the stone in certain spots. The figure is clothed in a sheepskin garment and bears a fillet of lapis-lazuli inlay upon her head. The eyebrows are inlaid with bituminous paste. Archæologists are especially interested in this work of alabaster because it shows how much more advanced the goldsmiths and workers in inlay were in producing masterpieces than the stone sculptors who carved these statues were in their art.

This same expedition is now at work on the excavation of the cemetery of the Jemdet Nasr period of 4000 B.C. A huge pit has already been driven down through strata representative of more than 2500 years of history. The cemetery of the Jemdet Nasr period lies about fifty-four feet below the surface. The several strata have already disclosed the remains of the time of Nebuchadnezzar, 600 B.C., brick-constructed tombs of the Kassite Age, and several cylinder seals, "cut in steatite or crystal," in the Sargonoid period. The discoveries in the Sargonoid strata have been declared the finest examples of the lapidary's art which have yet been uncovered. Archæologists expect to "find the answer to many puzzling questions concerning prehistoric Mesopotamia within the Jemdet Nasr level."

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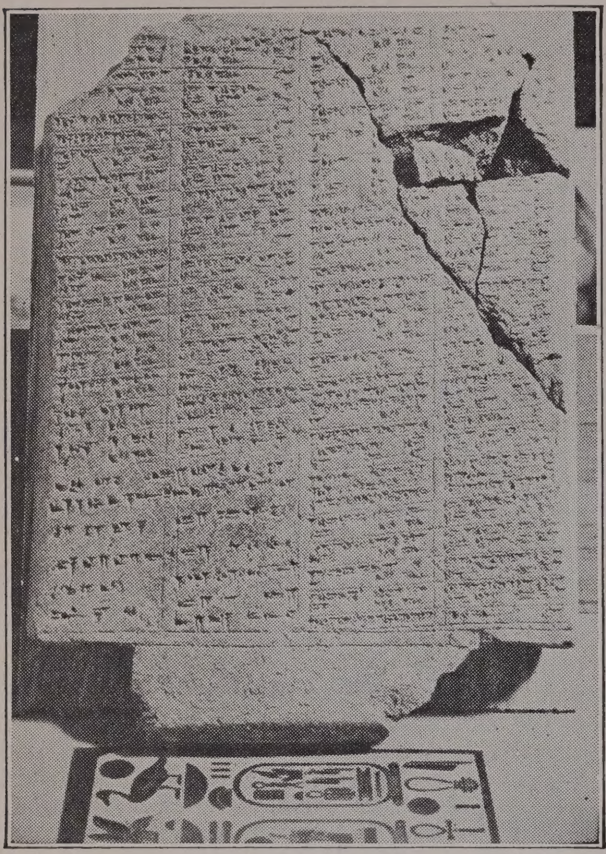
JEMDET NASR CEMETERY

A huge pit more than fifty feet deep was dug to uncover this cemetery which is over 6,000 years old.

A group of archæologists from the University of Texas recently conducted an exploration in Seminole Canyon, situated near the Texas border. In a single prehistoric dwelling were found 149 shoes lying about on the earthen floor. The shoes were made of fibre from the yucca plant and closely resembled the sandal which we know today. The toes of the shoes were square and tie strings were drawn through the shoes which bound them to the wearer's feet. Every shoe was quite badly worn and the sizes ranged from that of a child's small foot to the large foot of an adult. The inhabitants of this prehistoric dwelling are unknown to scientists and as yet unnamed. Archæologists believe that the shoes discovered here are typical of the style worn in the Texas Canyon about one thousand years before Columbus sighted American shores. The ancient dwelling yielded in addition to the large supply of footwear, about 5,000 articles, some badly dilapidated, such as flint axes and hoes, bone needles, baskets, pieces of fibre string and a few remnants of clothing, as well as many skeletons of its former inhabitants. With the aid of this valuable collection archæologists hope to succeed in removing the mystery and obscurity which has so long enshrouded the history of ancient Texas.

An expedition from the Peabody Museum of Harvard University has recently been at work along the banks of the Rio Grande de Coclé in western Panama. The dominating feature of the discoveries in this region was gold. Glittering gold had been fashioned by members of a civilization hitherto unknown, into personal ornaments, vessels for domestic use and statues of religious significance, and cast into the graves with the bodies of their dead. The work is so beautifully and intricately fashioned that only a wealthy and highly organized culture could have possibly produced it. The graves which yielded the gold articles, contained bodies which had been laid out in rows on huge stone slabs. In addition to the gold ornaments found here there were many pieces of pottery, stone axes, and massive breast-plates. Although archæologists do not ally the culture represented by these relics with either Mayan, Aztec or Inca civilization, they do believe that Parita, who defeated and drove off a group of Spaniards searching for gold in 1515, might have been a remnant of this civilization which produced these beautifully wrought relics.

One of the most valuable contributions to our meagre store of knowledge about the ancient civilization of Assyria was made by an expedition from the Oriental Institute of the University of Chicago. The Irak Expedition, under the direction of Gordon Loud, while excavating among the ruins at Khorsabad, unearthed a clay tablet which reveals facts hitherto unknown about ancient Assyrian history. Both sides of the tablet are inscribed with cuneiform writing. A translation of the writing, which was peculiar to the Assyrian race, reveals a chronological list of ninety-five Assyrian kings dating from the reign of Ashur-nirari V, 753-746 B.C. to the rulers of Assyria in 2400 B.C. Archæologists had formerly known of but three or four Assyrian kings, the earliest of whom was Ushpia. According to the history revealed by the clay tablet, Ushpia was the last ruler of a dynasty of nine kings. The tablet was discovered near the city of Mosul, a modern town on the upper Tigris River, opposite the ancient city of Nineveh. The Irak Expedition has been conducting excavations in this vicinity among the ruins of the palace of Sargon II, who was king over the Assyrians in the latter part of the eighth century, B.C. The palace of Sargon II was deserted during the reign of his son Sennacherib, who removed to Nineveh. The ancient tablet belongs to the Irak Government which has loaned it to the Oriental Institute so that it may be copied, studied and translated by Prof. Arno Poebel.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Assyrian Clay Tablet

An unimpressive clay tablet inscribed on both sides with cuneiform writing found by archæologists from the University of Chicago Oriental Institute in the ruins of King Sargon's palace at Khorsabad, Iraq.

The Fogg Art Museum of Harvard University recently announced the discovery by its expedition under the direction of Dr. Vladimir J. Fewkes, of a rich archæological area, which, it is believed, will reveal many relics of prehistoric and classical civilizations. The district is situated south of the Danube River in Yugoslavia. The expedition has already discovered an old Roman military road lined with forts believed to have been erected by Trajan, which continues eastward along the Danube River. The forts were a series of mounds covering huge foundations and structures of masonry long since collapsed. Roman influence during the days of the Empire was particularly strong in this area and literature has recorded military posts, roads, and cities which existed in and about the region now known as Yugoslavia. Archæologists have already unearthed remains which date back as far as 3000 to 200 B.C. In Macedonia a habitation mound of the Neolithic period was discovered which contained fragments of painted pottery, an indication that some cultural association must have existed between the Macedonians and inhabitants of the region about the Ægean Sea. Members of the expedition have already plotted and photographed about 2,000 sites which give promise to fruitful excavation. The richest territory of the area is believed to extend eastward form the "Iron Gate," situated about 120 miles east of Belgrade, to the border of Bulgaria. Archæologists have expressed the hope that when "the whole archæological picture is complete they will give a clear picture of culture diffusion dating through the Classical, Iron, Bronze, and Neolithic ages."

See Assyria; Aztec; Babylonia; Cave Men; Egypt; Herculaneum; Incas; Mayan Civilization; Mound Builders; Pompeii; Rome; Rosetta Stone; Stonehenge; Tutankhamen; Pueblos.

Archangel (*ärk-ān'jĕl*), or **Arkhangelsk** (*ȧr-kän'gĕlsk*), an important city and seaport of Soviet Russia and capital of the province of the same name. It has an extensive trade in timber, tallow and tar. Its chief imports are coal, salt, machinery, and fruit. The city is connected with the interior by river and canal. An English sailor, driven ashore by a storm, once took refuge in a monastery on the site of Archangel. As the result of his visit, an English factory was started there in 1584. For many years Archangel was the only seaport of Russia and became very prosperous. During the World War Archangel was an important point of communication between Russia and the Allies.

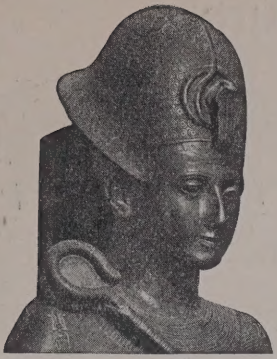
The shortest day here is only three hours and twelve minutes in length, the longest is twenty-one hours and forty-eight minutes. The population of the city is 128,800. The population of the province is 419,900.

Archegonium (*är-kē-gō'nĭ-ŭm*), the female organ of certain groups of plants, namely, the *Bryophytes* (mosses, etc.), the *Pteridophytes* (ferns, etc.), and the gymnosperms (pines, etc.). In general it is a flask-shaped structure. In the bulbous part of the flask the solitary egg is developed; while through the open and often elongated neck the sperms pass for fertilization. So characteristic is this organ that the three groups which possess it are often classed under the name *Archegoniates.*

Archesporium (*är'kē-spōr'ĭ-ŭm*), in plants, a developing spore-vessel sets apart certain cells from all others to produce the spores. The first cells which can be distinguished in this way, and which give rise to all of the tissues which produce spores, are known collectively as the archesporium. The archesporium is a prominent feature in the history of the sporangia of all higher groups of plants.

See Plant Breeding.

Archibald, Hon. A. G., a distinguished Canadian diplomatist, was born in Truro, Novia Scotia, in 1814. A member of the

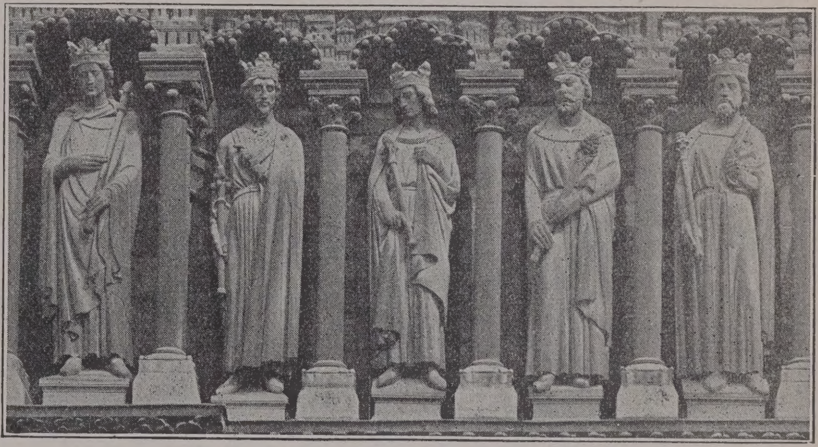

Rameses II.

How Sculpture and Painting Grew Out of Architecture

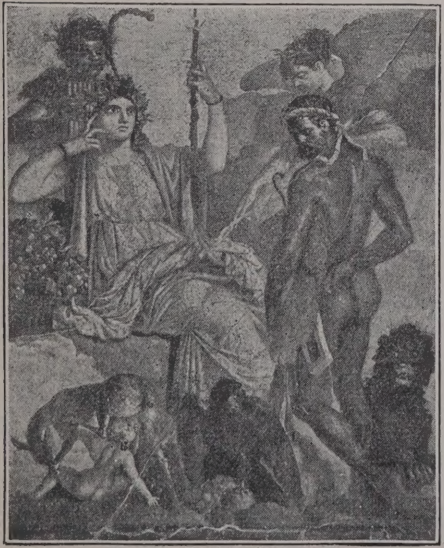
WHY did the Egyptian sculptor attach that curious block of stone to his statue of Rameses II? The question long puzzled Egyptian scholars. Finally they found the answer in comparing Egyptian statues with the carvings on the temples and tombs. The earlier sculptors, you see, simply cut the figure into the stone. In the course of time came the next step—the figure stood out from the wall. Then followed the idea of a figure entirely independent of the wall. But among Orientals, where custom is sacred, they felt it to be wrong to make figures without *some* reminder of the wall—hence those curious and apparently meaningless blocks of stone. Notice in the figures from Notre Dame in Paris how Christian sculptors again connected sculptured figures with temple walls.

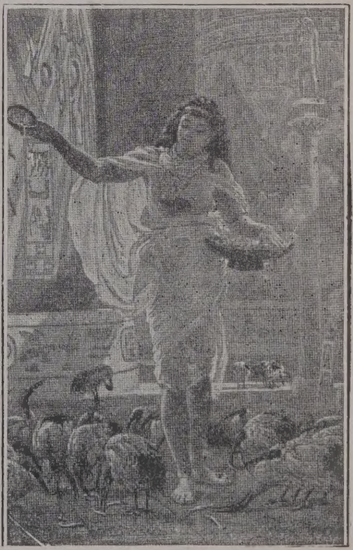
Rameses and Family

Thoth Presenting Symbol of Everlasting Life to King Seti


Wall Decoration from Notre Dame, Paris

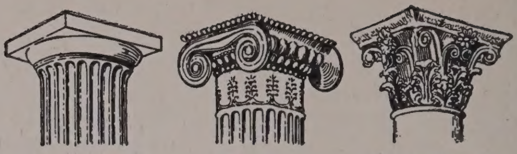
The first paintings were also made upon walls, as in this wall painting from Herculaneum, "Telephus Nursed by the Hind," now in the National Museum at Naples. On the right, in the painting by the English artist, Poynter, "Egyptian Girl Feeding the Sacred Ibis," you can see the whole story of the relation between architecture, painting and sculpture epitomized.


Early Wall Decoration


Feeding the Sacred Ibis

Studies in Architecture

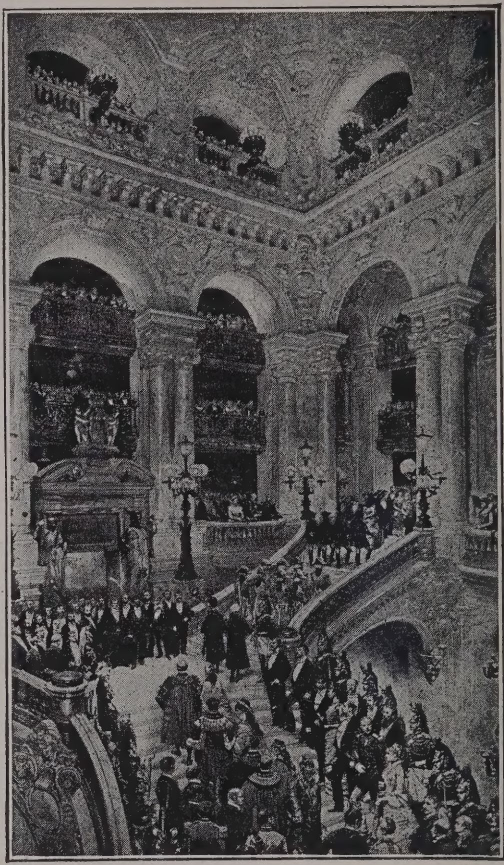
The Parthenon


Doric Ionic Corinthian

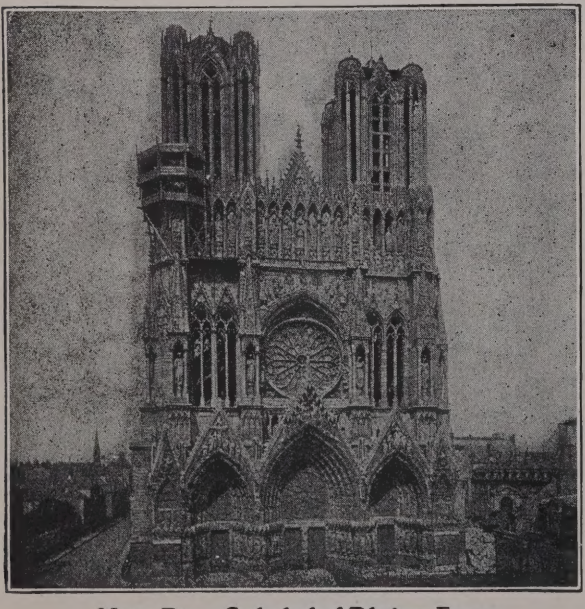
The Three Types of Greek Capitals

THIS picture group shows the Parthenon, the most famous piece of architecture in the world; the altar of St. Mark's, the classic type of Byzantine architecture; two types of medieval architecture—the wonderful cathedrals at Rheims and Cologne—and a brilliant example of modern architecture, the interior of the $5,000,000 Grand Opera House in Paris on the opening night.

Basilica of St. Mark's, Showing Altar


Original in the Luxembourg, Paris

Inauguration of the Grand Opera House. Painting by Edouard Detaille (French b. 1848)


Notre Dame Cathedral of Rheims, France

Cologne Cathedral, Germany

executive council as attorney general of Nova Scotia in 1856 and again in 1860. A delegate to England to arrange terms of settlement with the British government as to Nova Scotia mines, and to learn the views of the British government on the question of union of the provinces. Also attended the final conference in London to complete terms of union (1866–7). In 1867 Secretary of State for the provinces. Lieutenant Governor of Manitoba in 1870–3. From 1873 to 1883 Lieutenant Governor of Nova Scotia. A Director of the Canadian Pacific Railway. Styled one of the Fathers of Confederation.

Archimedes (*är-kĭ-mē′dēz*), a Grecian engineer, physicist, and mathematician, born at Syracuse, on the island of Sicily, about the year 287 B. C. What little is known concerning the details of his life is contained in the histories of Polybius, Plutarch and Livy and in the treatise on architecture by Vitruvius.

Like many men of science belonging to this period, he was educated at Alexandria.

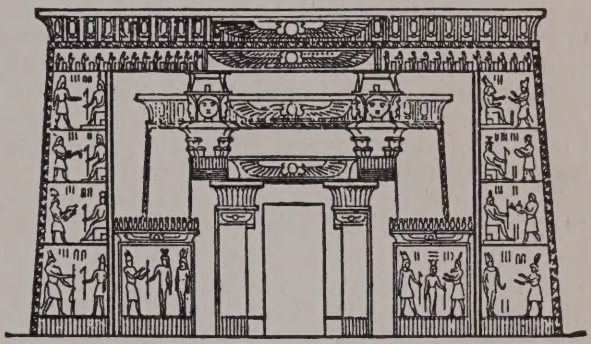
His principal contributions to learning are (1) a large number of geometrical theorems; (2) a short treatise on arithmetic called *Psammites*, because grains of sand were used in the computations; (3) a determination of the centers of gravity in bodies of various shapes, a work which may be fairly called the foundation of modern statics; (4) a treatise on floating bodies; (5) in addition to the above, it is probable that he invented the screw which goes by his name and that he devised a hydrometer by which he could compare the densities of liquids.

Many stories have come down to us concerning his engineering feats at Syracuse while that city was besieged by the Romans during the second Punic War. Most of these stories are not well authenticated.

The best known perhaps is that told by Vitruvius. Having been assigned the problem of determining whether a certain crown supposed to be made of pure gold had been alloyed with silver, he devised the following method: First he measured the volume of a mass of gold just equal to the mass of the crown. This he did by putting the gold in a vessel of water and measuring the overflow. The second step was to measure, in the same way, the volume of a mass of silver just equal to the mass of the crown. Lastly he measured the volume of the crown which proved to be intermediate between that of the gold and that of the silver. From these data it was a simple matter to compute the percentage of silver in the crown. This method, it is said, suggested itself to him as he was getting into his bath, where he observed that the rise of water on the sides of the tub was apparently proportional to the volume of his body immersed.

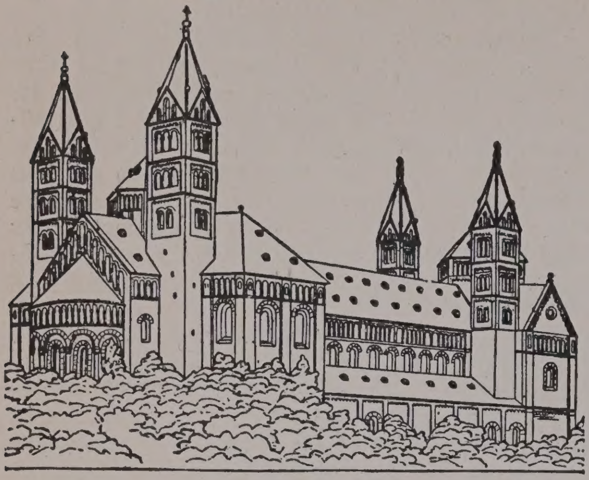
The story goes on to relate that Archimedes announced this discovery by running through the streets, clothed principally with enthusiasm, and shouting "Eureka! Eureka!" (I have found it.)

Architecture (*är′kĭ-tĕk′tūr*), is the art of building. All the different styles of constructing and decorating buildings can be traced back to two early forms, used according as the material was either wood or stone. The form used for wooden buildings was two upright pillars and a crossbeam at the top. The arch with its strong abutments was the form generally used for stone buildings. The oldest architectural remains are those of the Egyptians. They are rough and stiff, and show that men had only begun to think about the rules of building and to ask what makes any structure beautiful. The most noticeable features in Egyptian buildings are their immense size and their simplicity and regular outline. How the immense blocks of stone used in them were moved and raised to their place is a cause of wonder today. Most of the temple remains are in Upper Egypt, though the greater part of them were destroyed by the Persians in 500 B. C. The walls and pillars were usually ornamented with hieroglyphics and with outlines of different sorts; but they had little of the grace and elegance of the later Greek architects. Besides the temples, the most interesting structures are the pyramids, which are supposed to be the tombs of Egyptian kings. They are built of immense blocks of stone put together in regular form, gradually narrowing from the broad base to the small-pointed apex. The largest of them is 093 feet square at the base and 498 feet high. Herodotus states that it was built by Cheops, who kept one hundred thousand men working on it for twenty-years. The obelisks are single four-cornered shafts of great height, usually of red granite and commonly cut from the quarry in a single block. They were placed at the entrances of temples or palaces, covered with hieroglyphics and figures illustrating the victories and great deeds of their kings.



EGYPTIAN—FRONT OF TEMPLE OF ISIS AT PHILÆ

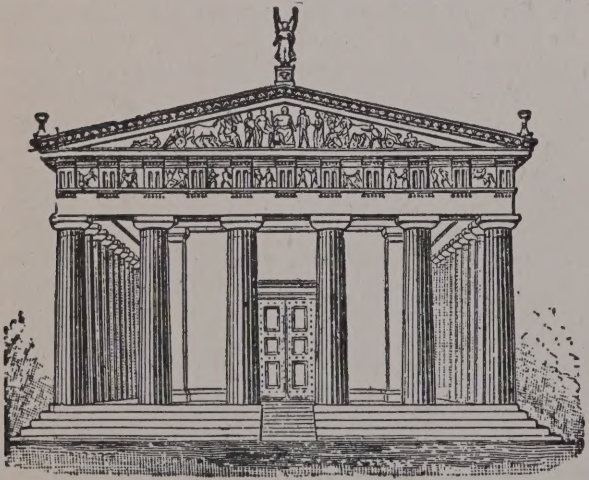
In Assyria and Persia are found the ruins of great palaces; among the oldest is the northwest palace of Nimrod, built about 884 B. C. A palace at Susa, Persia, was evidently built of brick and faced with colors in enamel. The Greeks are thought to have taken some of their ideas in building from Assyria and Persia. But it is in Greece that we find the greatest number and most perfect specimens of ancient architecture. The temples and theaters of Asia Minor and Greece were of great magnificence and wonderful for their grace and delicacy of outline. (See ATHENS.)



ROMANESQUE—CATHEDRAL OF WORMS

There are three styles of Grecian architecture, called the Doric, the Ionic and the Corinthian, the most important difference being in the head or capital, as it is called, of the pillar. The most flourishing period of Greek architecture was from 650 to 324 B. C.

The Romans borrowed mainly from the Greeks, but used their architecture not only upon temples and theaters, but on many other kinds of buildings, such as baths, bridges, aqueducts, triumphal arches and private houses. They borrowed the round arch from the Etruscans, and soon made use of its principle to construct immense circular domes or vaults. Many great Roman buildings still remain. When Byzantium became the capital of the Roman empire, Roman architecture was in use there. The dome was specially affected by the Byzantines. In the reign of Constantine the Christians were allowed to build churches, and the term Byzantine designates the architecture of the Christian churches of eastern Europe and Asia Minor of that period. One of the finest of these churches is that of St. Sophia at Constantinople.



GRECIAN DORIC—TEMPLE OF JUPITER AT OLYMPIA

Romanesque is the name given to the various round-arched styles which arose in Europe after the inroads of the northern barbarians. The Saxon style of building was rude and simple. It was followed in England by the Norman, which is distinguished by the rich and odd carving on the doorways and arches. Most of the best-known buildings in England and Scotland belong to this style. The Gothic or pointed style followed, with its three periods. In the first we find the narrow, pointed windows and high gables and roofs. A part of Westminster Abbey is built in this style. In the second period, the windows are divided into small panes, the upper part filled with beautiful tracery in waving lines. The third period is called the perpendicular period. The tracery is no longer in wavy, but in straight, lines. The doorways have square tops over pointed arches. Westminster Hall in London is a good example of this style, which lasted from the end of the 14th to the middle of the 16th century. At the time of the great revival of learning in Italy, in the 15th century, the old Roman style of architecture, in a slightly altered form, was revived. This style is called the Italian Renaissance. St. Peter's at Rome and the Louvre and the Tuileries at Paris are good examples of it.

Another style of building is the Moorish or Saracenic, which dates back to the 9th century. It is noted for its graceful towers, beautiful domes, the slender pillars which support the walls and for the frequent use of the arch. The Moorish palace of the Alhambra well illustrates this style.

Modern architecture is the name employed for all varieties of building in use since the Renaissance. In the 18th century Greek forms were copied, and in the 19th century the Gothic form was popular. All modern architecture is in imitation of the older forms. Churches are largely imitations of the Gothic, while private buildings are of the Renaissance type.

Arcot (*är-kŏt′*), a city of Hindustan, once the capital of the Carnatic, is situated on the Palar, about 70 miles southwest of Madras. In it are many ruins, among them the palace of its princes, who were called nabobs. The people are, in the main, Mohammedans. Arcot was taken by Clive in 1751, and by the French in 1758. In 1780 Hyder Ali captured the city. Arcot finally became a British city in 1801. The population is about 12,000.

See Clive, Lord Robert.

Arctic (*ärk'tĭk*) **Circle**, an imaginary circle drawn around the North Pole at a distance of twenty-three and a half degrees from the pole. The corresponding circle around the South Pole is the Antarctic.

Arctic Exploration. See Polar Exploration.

Arctic Ocean, that portion of the ocean which lies north of Europe, Asia, and North America, and within the Arctic Circle. It has an area of 4,781,000 square miles and its average depth is 5,160 feet. The principal rivers that empty into this ocean are the Mackenzie and Black in North America, and the Obi, Yenisei, and Lena in Asia. Its largest islands are Greenland, Spitzbergen, Wongatz, Nova Zembla, New Siberia, Wrangel, Prince Patrick, Melville, Banks Land, Ellesmere Land and Grinnell Land.

An expanse of ice extends around the pole during the winter months and even in the summer season the temperature is still at the freezing point. From this region come the ice-floes and floe-bergs, not the flat-topped tabular icebergs of the southern hemisphere, which drift into the Atlantic through Baffin Bay and Bering Strait in the spring and summer months. In addition to the dangers of the ice, fog and snow make doubly treacherous a voyage through the storms, tides and currents of these waters. Within the past three hundred years many voyages have been undertaken to make discoveries in this region or to find a passage through it. In 1906 Peary reached a point 206 miles distant from the North Pole, and on April 6, 1909, reached the pole itself. The pole was reached a second time on May 9, 1926, when Commander R. E. Byrd and Pilot F. G. Bennett circled the pole in a Fokker monoplane, the *Josephine Ford.*

Sea mammals abound in the Arctic Ocean, especially whales and seals. The right whale is found east of Greenland, in Baffin Bay and north of the Bering Strait. There are also species of the razorback, the humpback, the grampus, the bottlenose, the white whale, and the narwhal, found in the Arctic waters. Pinnipeds include both walrus and seals. The former, yielding rich ivory, skin and oil, have been slaughtered in great numbers by fishermen in Europe, and around the southern part of Baffin Bay. They are still plentiful, however, in Smith Sound region, Spitzbergen and Franz-Josef Land. Here the north Atlantic species are found while the Pacific species abound on the northern coast of Alaska and Kamchatka. The seals in the Arctic Ocean have a "circum-polar distribution."

There are about 150 species of fish in the Arctic Ocean. Fisheries of great value exist on Russia's northern coast around Spitzbergen and Nova Zembla. The most important fish are cod, halibut, and many species of flatfish.

See Amundsen, Captain Roald; Antarctic Explorations; Byrd, Admiral R. E.; Cook, Capt. James; DeLong, G. W.; Franklin, Admiral Sir John; Frobisher, Sir Martin; Greenland; Kane, Elisha Kent; Nansen, Fridtjof; Nome; Perry, Robert; Polar Exploration.

Arcturus (*ärk-tū'rŭs*), the brightest star in the northern heavens, is in the constellation Boötes. The word is a combination of the Greek *arktos*, meaning bear, and *ouros*, guard. Arcturus is exceeded in brightness by only two stars in all the heavens, Sirius and Canopus. Its parallax, according to Elkin, is 0".024. Its distance from us is about 8,500,000 times the mean radius of the earth's orbit. Many astronomers believe it is the nearest of the stars.

Arcturus, which may be found by continuing the curve of the three stars which form the handle of the Dipper, or Ursa Major, was known to the ancients. According to legend, Arcas, son of Lycaon, king of Arcadia, was killed by his father as a sacrifice to Zeus. Later, he was restored and transformed into the star Arcturus.

A Century of Progress 1933 was opened by light waves from the distant Arcturus, caught by delicate instruments and transmitted through intricate apparatus to energize the switches that turned on the great floodlights by means of which the grounds and buildings were illuminated. As the scientific motive of the Exposition was the display of the progress of science in its applications to every phase of the life of modern society, this use of the rays of the far distant star was very appropriate. Waves from Arcturus also turned off the lights at the close of the Exposition, but the star was not used to light the Century of Progress 1934.

Ardèche (*ȧr-dĕsh'*), a Department in the southern part of France. Its name is derived from a tributary of the Rhone which rises in the Cévennes Mountains in the northwestern part of the Department. This is an extremely mountainous region. The volcanic Mount Mezène, which towers to a height of 5,752 feet, is situated here. The uplands, where the winter season endures for a six or eight month period, is devoted almost exclusively to pasturage. In the valley of the Rhone, wine, olives, chestnuts, figs and almonds are produced in large quantities. The Department is especially rich in iron, coal, antimony, lead, marble, and gypsum. The principal manufactures are silk, paper, leather textiles, and straw. Ardèche extends over an area of 2,144 square miles. In 1931 the population was 282,911. The capital city is Privas.

See France.

Arden, Forest of, a vast tract of woodland which in the days of early Britain, was the largest forest within its confines. The forest, which is still heavily wooded, extends over the midland counties of England, but lies principally in Warwickshire. Just north of the river Avon this region was once a dense forest. The scene of Shakespeare's *As You Like It* is laid in the Forest of Arden.

See As You Like It; Shakespeare, Wiliam.

Ardennes (*ȧr-dĕn′*), a Department in the northeastern part of France bordering on Belgium. Ardennes was of especial importance during the World War, 1914-18. It was here that the famous Rainbow Division of the American troops, together with the Allies, broke down the German line of resistance along Mézières, Sedan, Montmedy, in 1918.

Ardennes is a hilly and forested region, excellent for pasturage. This extensive region spreads into the southeastern corner of Belgium, between the Moselle and the Meuse, and into Rhenish Prussia. The broken mass of hills slope gently towards the broad plains of Flanders. In the valleys, abounding in fertile soil, corn is cultivated. In southwestern Ardennes vine cultivation is important. The principal industry of the Department, however, is the manufacture of cloth which is centered in Sedan. Other important manufactures include clay pipes, glass, sugar, malt liquors, and paper.

The Department covers an area of 2,027 square miles. The capital is Mézières. The most important city is the fortified city of Sedan. In 1931 the population of Ardennes was 293,746.

See France; Sedan; World War.

Ardmore, a city and the seat of Carter County, Oklahoma, is situated about eighty miles southeast of Oklahoma City. It is served by the Gulf, Colorado and Santa Fe, and the Choctaw, Oklahoma and Gulf railroads. It is in the center of a cotton-growing and stock-raising district, and near extensive deposits of asphalt, coal, and large oil fields. Hargrove College is situated in Ardmore. In 1930 the population was 15,641.

Areopagus *ăr-ē-ŏp′ȧ-gŭs*), the hill of Ares or Mars in ancient Athens, near the Acropolis. The most famous court in Greece was named from this hill, on which it met in the open air. Its members were the former archons, highest officers in Athens. They served for life. The Areopagus exercised supreme judicial power, and indirectly controlled the State. In the code of Draco, it remained the court for all cases of willful murder. Under the Solonian Constitution it kept the power of procedure against any citizen or official whose conduct was an offense against the moral welfare of the community. However, it lost its deliberative functions and could no longer take direct part in administration and legislation. Nevertheless, even in Roman times it was the most highly venerated body in Athens. The hill is also famed as the place where Paul made his address to the Athenians, as recorded in the *Acts of the Apostles.*

See Paul, St.

Arequipa (*ä′rȧ-kē′pȧ*), a department in the South American republic of Peru. It is situated in the southern part of the republic, between Lake Titicaca and the Pacific. Its area is 21,947 square miles, with a population of 360,000. Its capital is the city of Arequipa which lies in a fertile valley near the volcano of Misti (sometimes called Arequipa), which rises to a height of 20,013 feet. Among its prominent buildings are the cathedral, public library, hospital, astronomical and meteorological observatories. The meteorological station is 16,280 feet above sea level, the highest in the world. Its exports include (besides minerals) cotton, coffee, hides, rice, cocaine, wool and sugar. The province, being on the Andean range, is mountainous. A railway connects it with Mollendo, its port on the Pacific, while a line connects it eastward with Puno on Lake Titicaca. It has a population of about 360,000.

Argentina (*är-jĕn-tē′nȧ*), **The Republic of**, the second largest country of South America. It is bounded on the north by Bolivia, on the northeast by Paraguay, on the west by Chile, and on the east by the Atlantic Ocean, Uruguay and Brazil. It covers an area of 1,153,418 square miles.

Surface. Argentina is a country of vast plains. The basin of the Paraná River, the second largest river in South America, lies in the northern part of Argentina. Here are large tracts of prairies or pampas which are especially suited for pasturage and the growing of wheat. Rich cultivated districts spread out around the Paraná and Paraguay Rivers. Farther north are found the sugar lands and timber tracts of the country. The heavily wooded plains in the northern section are called the Gran Chaco. In the central portion of the Republic are the great pampas, treeless plains, extending from the mountain range on the west to the Atlantic on the east. Here are the great wheat fields and cattle ranges for which Argentina is famous. To the south are wide sandy plains. South of the Strait of Magellan is the island of Tierra del Fuego, 8,344 square miles of which are Argentine territory. Although vast plains sweep over the major portion of the republic, yet on its western border rises the great mountain range of the Andes, which reaches its highest peak in northwestern Argentina. Aconcagua, the loftiest peak in the Western Hemisphere, rises to 22,834 feet. Other lofty peaks include Mercedario, 22,315 feet; Tupangato, 20,280 feet; Famantina, 20,700 feet; Incaguassi, 21,400 feet; Veladeres, 21,000 feet. In April, 1932, there were volcanic eruptions along the Andes which followed a course of about 400 miles in length.

The Rio de la Plata, which is formed by a junction of the Paraná and the Uruguay Rivers, receives the waters of about 10,000 miles of waterways. It is about 2,300 miles long and flows out into the Atlantic Ocean. Inland from the ocean about 185 miles the Rio de la Plata narrows in somewhat the same manner as a gulf. Its course thereafter is known as the Paraná, the length of which is 2,450 miles. By this extensive river system not only all of northern Argentina, but parts of Brazil, Uruguay, Paraguay and Bolivia are made accessible to Buenos Aires, the capital of the Republic of Agentina.

Climate. In the elevated plains region, the climate is temperate and slightly variable. One of the most agreeable climates in the world is to be found in that wide stretch of country between Mendoza and Buenos Aires. The northern section of Argentina, situated nearer the equator, suffers from extremes of heat, the temperature often mounting to 115°. The humidity is noticeably less in the southern regions where the west winds prevail.

Resources. Mining is of small importance in Argentina. Many kinds of minerals are to be found here such as gold, silver, copper, lead, tin, iron and coal. These resources, however, are for the most part undeveloped. The principal resources of the Republic are agricultural and pastoral. There are considerable areas of valuable forests, too distant, however, from the centers of population to make possible their economical exploitation.

Production and Industry. The vast area of fertile territory in Argentina, its varied climate suitable to the growth of every product of the temperate zone and the tropics, and its extensive river system giving ample transportation facilities, make this Republic one of the great producing nations of the world.

The principal crops are wheat, maize, flax, and oats. In 1932, there were 3,441,882 tons of wheat exported; 7,055,387 tons of maize; 2,027,609 tons of linseed; and 715,621 tons of oats. Other crops under cultivation include cotton, tobacco, sugar, and *yerba maté*, (Paraguayan tea). In 1931 the harvest of sugar cane from 354,400 acres amounted to 4,937,100 tons. The raw sugar production from this harvest was 345,800 tons. Argentina abounds in vineyards. There are about 353,700 acres of vineyard throughout the Republic, the average yield of wine from this acreage being about 7,000,000 hectolitres.

The chief industry of the Republic is meat refrigeration. Wealth on the ranches is made up principally of sheep, cattle, horses, goats, and pigs. According to the livestock census of 1930, Argentina had: cattle, 32,211,855; horses, 9,858,111; sheep, 44,413,200; and pigs, 3,768,738. In 1931 the slaughter at Argentine packing houses totalled, cattle, 2,309,385; sheep, 5,388,326; and hogs, 392,428. In 1932 there were 370,634 metric tons of chilled beef exported; 36,660 of frozen beef; 70,631 of frozen mutton; and 44,687 of preserved meat. Buenos Aires has the largest refrigeration plant in the world. Among Argentina's other important exports are wool, butter, casein, and cheese. More than half of the hides imported by the United States are received from the Republic of Argentina. In 1932 there were 132,435 metric tons of hides and skins exported. Flour milling ranks second among the country's industries. In 1929 an 81,000 ton grain elevator was constructed near Bahia Blanca.

Population. In 1932 the population of Argentina was officially estimated to be 11,846,655. The Indian population has been estimated at between 20,000 and 30,000. There are about 237,768,000 acres that have been set aside as public domain land and opened by the Federal Government to colonization. In 1932 there were 31,267 immigrants who entered Argentina. These inhabitants are overwhelmingly European in origin, (chiefly Italian and Spanish), with practically no mixture with the aborigines. In 1919 a law was enacted which requires each intending immigrant to produce a certificate of good character and ability to work. The most important cities of the Republic, with their estimated populations in 1932, are Buenos Aires, the capital and one of the chief ports, 2,214,700; Rosario, 485,354; Córdoba, 253,182; Avellaneda, 214,512; La Plata, 182,401; Santa Fe, 125,295; Tucuman, 123,572; Bahia Blanca, 102,430; Paraná, 74,338; and Mendoza, 76,780.

Education. Primary education is subsidized by the General and Provincial Governments. It is free, secular and compulsory for children from six to fourteen years of age. In 1931 there were 11,552 primary schools with 54,685 teachers and an enrollment of 1,441,348. There were 232 secondary, normal and special schools with 89,595 pupils under the Ministry of Public Education. There were 241 provincial secondary schools with 13,709 pupils in that same year. Private schools numbered 1,360, and had a registered enrollment of 169,598 pupils. The development of the educational system has resulted in a marked decrease in illiteracy, which was reduced from thirty-five per cent in 1916 to slightly more than twenty-one per cent in 1930. There are six national universities in the Republic: at Córdoba, founded in 1613; Buenos Aires, founded in 1821; La Plata, 1897; Tucuman, 1912; the National University of the Litoral in Santa Fe, 1920, with branches in Rosario and in Corrientes.

Government. Argentina is a Republic composed of a federal district, fourteen provinces and ten territories. Its constitution, dating from 1853, with a number of outstanding revisions, is modelled on that of the United States. The President must be a Roman Catholic and an Argentine by birth. He is elected by an Electoral College of 376 members, for a six year term, and is ineligible for reëlection. The National Congress consists of a Senate of thirty members, chosen by a special body of electors for a six-year term, one-third retiring each two years; and a House of Deputies of 158 members, elected by direct vote for four years, one-half retiring every two years.

Each province has a governor and a provincial legislature. There are Federal and Provincial Courts, similar in both powers and functions to the Federal and State Courts of the United States. Governors for the territories are appointed by the President, as are the mayors of cities, with the approval of the

Senate. The Mayor is assisted by a deliberative council in which voting is compulsory under penalty of a fine. In Buenos Aires, this Council consists of thirty members. Service in the national militia is compulsory.

History. The first Europeans who visited the country were a party of Spanish explorers. Juan Diaz de Solis, in search of the Great South Sea, entered the Rio de La Plata in 1515, but was killed, with part of his company, in 1516. Sebastian Cabot, in 1526, penetrated to the junction of the Paraguay and Pará, but was checked by the rapids. In 1535, Pedro de Mendoza, with 2,000 followers, founded Buenos Aires, the first real settlement. This, however, was broken up by the natives, and the settlers migrated farther up the river and founded Asunción. Buenos Aires was later resettled, and in 1776, after bitter years of war and bloodshed in making other settlements, it was made the capital of a vice-royalty. Not until 1805 was it well established, by Juan de Garay. In 1806, when Spain was at war with England, the city was captured by English troops, but soon regained. In 1807, Montevideo was taken by the English, but the attack on Buenos Aires failed, and a capitulation leading to complete withdrawal was signed. These successes against the English gave the people courage to rise against Spain. On the twenty-fifth of May, 1810, a provisional government was set up, from which date the independence of Argentina is usually counted. But the whole of the vice-royalty did not acknowledge this government. Freedom from Spanish rule actually came about 1816; but anarchy continued until 1853, when a stable government was established, although there followed many civil wars between the leaders of the two political parties, the Unitarians and the Federals.

Argentina withdrew her delegation from the League of Nations in 1920, and, although the League Assembly unanimously requested her to return in 1928, she persisted in her refusal to do so. The world-wide agitation attending the execution of Sacco and Vanzetti in the United States was reflected in Argentina in various demonstrations. The passage of the Fordney-McCumber Tariff Act also aroused Argentina, and the United States, intervention in Nicaragua brought strong protest. At the Sixth Pan-American Conference, in 1928, Argentina took the lead against the intervention of any country in the internal affairs of another. When the Conference met in Washington, later in that year, Argentina was the only country not represented. In 1929, the history of the country was marked by political disturbances threatening the constitutional government, by the policy of isolation, and a growing resentment towards the tariff policy of the United States. The attack of the President on graft and corruption led to his deposition in 1930, by a revolt of army officers, and the return to power of the wealthy conservatives. The Provisional Government which was set up announced every intention of cooperating with the United States. In May, 1932, the Congress authorized the President to join the League of Nations, with a reservation withholding recognition of the Monroe Doctrine.

In 1933, the Government suppressed the revolts which threatened to disrupt the peace and security of the republic by declaring a "state of siege." The most serious revolt was encountered in Santa Fe Province. There at Rosario, several were killed and many injured. In the provinces of San Luis, Corrientes, and Buenos Aires, radical groups seized postoffices, police stations and arsenals. In January 1934, a number of radical leaders, among whom were former President Marcelo de Alvear and Honorio Pueyrredon, former ambassador to the United States, were exiled to Europe. On January 20, more than forty-five rebels, who had been charged with complicity in the revolutionary outbreaks, were exiled to Ushaia, a penal colony situated in the southernmost part of South America. After a period of comparative peace, disturbances broke out on February 21 in the province of San Juan. Public buildings and communications were seized by a coalition of National Democrats and Socialists under the leadership of State Senator Carlos Porta.

During the first quarter of 1934 a commercial treaty was concluded between Argentina and Belgium. The treaty accords each country unconditional and unlimited most-favored nation terms in respect to customs duties, special charges and inspection formalities. The new trade agreement is not considered detrimental to Anglo-Argentine interests which are carefully outlined in the Roca Pact. Anglo-Argentine trade has shown a marked increase since the signing of the Roca Pact.

See Buenos Aires; Gran Chaco; South America.

Argon (*är'gŏn*), an inert gas discovered in 1894 by Lord Rayleigh and Sir William Ramsay of England. It is a mixed substance, containing, besides pure argon, *helium* and minute quantities of *neon, krypton,* and *xenon.* It is associated with nitrogen in the proportion of 11.86 parts by volume of argon to 1000 parts of the mixed nitrogen and argon. Neither argon nor its companions form chemical compounds. As distinguished from its companions, argon liquifies at—187 degrees C., and freezes at—189 degrees C., under a pressure of one atmosphere. In the liquid state the density is 1.212. The ratio of its specific heats is 1.67. This high value indicates a simple molecular structure, and an inappreciable amount of rotational molecular energy. The spark spectra of argon are decidedly characteristic, varying in appearance according to the pressure.

Argonauts (*är'gō-nôt*), in Greek story, the band of heroes who sailed, before the Trojan war in the ship *Argo,* in search of the golden fleece; Argonauts meaning sailors of the *Argo.* Pelias, king of Iolcus in Thessaly, was warned by an oracle to fear his nephew, Jason. Planning his death he sent him to capture and bring home the fleece of the ram which had carried off the brother and sister, Phrixus and Helle, and which Phrixus had sacrificed to Jupiter. Phrixus had nailed the fleece to an oak in the grove of Mars in Colchis, where it was guarded by a sleepless dragon and by fire-breathing bulls. Jason set sail with the principal heroes of Greece, among them Castor and Pollux, Hercules and Orpheus. After various adventures in Lemnos, Mysia and the land of the Bebryces, and after successfully passing between the floating islands of the Symplegades, which were dreaded because of their custom of dashing to pieces whatever came in their way, the Argonauts reached Colchis. The king of Colchis promised Jason the golden fleece if he would yoke the fire-breathing bulls to the plow and sow the dragon's teeth, from which warriors always sprang up to kill the sower. With the aid of Medea, the king's daughter, a powerful enchantress, who had fallen in love with Jason, the latter achieved these tasks. Finding the king plotting against him, he seized the fleece and set sail with Medea and her brother, Absyrtus. When the king pursued them, Medea killed her brother, and throwing his body into the sea, piece by piece, so delayed her father, that the *Argo* escaped, though, because of their crime, they suffered many things on their homeward journey.

Ar'gos, an important city of ancient Greece, in Argolis. It was believed to be the oldest city in Greece, dating back as far as 1500 B. C. At the time of the Trojan War it was a famous capital, and from it the Greeks were often called Argives (*ar'jivz*). Before the rise of Sparta, Argos was at the head of a powerful league of Doric cities, but in later Greek history it plays little part. Its site is occupied by a modern town of the same name, which has a population of about 10,000. Here are remains of ancient cyclopean structures, among them a grand amphitheater hewn in the rock and a large aqueduct.

Argyle (*är-gīl'*), **George Douglas Campbell,** eighth duke of, was born April 30, 1823, and died April 24, 1900. He held important offices in the English government, and was a liberal in politics. He also wrote valuable religious and scientific works, among them *The Reign of Law*, and *Primeval Man*. His eldest son, the Marquis of Lorne, married the Princess Louise, daughter of the late Queen Victoria. This is the first instance of the marriage of a daughter of a reigning sovereign of England to a subject. The marquis succeeded to the dukedom on the death of his father.

Argyll, John Douglas Sutherland Campbell, ninth duke of, long known as Marquis of Lorne, husband of H. R. H. Princess Louise, fourth daughter of the late Queen Victoria, was born in 1845 in London and educated at St. Andrews University and Trinity College, Cambridge. From 1868 to 1878 he represented Argyllshire in Parliament as Liberal member, and later sat for South Manchester. In 1871 he married Princess Louise, and was governor-general of Canada from 1878 to 1883. In 1900 he succeeded to the dukedom of Argyll and has since sat in the House of Peers. His writings include *A Trip to the Tropics*, *Guido and Lita*, *The Psalms Literally Rendered in Verse*, a work on *Imperial Federation* and a *Life of Queen Victoria*.

Ariad'ne. See THESEUS.

Aries (*ā'rĭ-ēz*), a northern constellation, known as the ram. It is the first of the twelve signs in the zodiac, which the sun enters at the vernal equinox (March 21). Owing to the precession of the equinoxes, the constellation now is not within the limits of the sign.

Ari'on, a poet and musician of Lesbos, Greece, who lived about 625 B. C. He is said to have invented a new form of verse; but all we know of him is the pretty story told of him by the historian Herodotus. Arion had traveled all over the world and gained great fame and a large sum of money by his skill in singing. On the homeward voyage the sight of his treasure roused the cupidity of the sailors, and they decided to kill him. He was told he must either die by his own hand on shipboard or throw himself into the sea. He chose the latter, but first asked leave to sing one last song. The sailors agreed, and Arion, standing on the deck, sang a dirge, accompanying himself on the lyre. He then jumped overboard, but instead of drowning was borne up by a dolphin that had been charmed by the music. The dolphin carried him to the coast, from which he reached home before the ship. He told his story to the prince, who hardly believed him. On the landing of the sailors, they first said that they had left Arion behind; but when they saw him, they quickly confessed and were punished.

Arios'to, Ludovico, a famous Italian poet, was born at Reggio near Modena in 1474, the eldest of ten children. As a boy he showed ability and taste in composition, but at the wish of his father he studied law. After a trial of five years he gave up the attempt, and turned to the study of the classics, and devoted himself to literature as a profession. A few lyrical poems gained him as a patron the son of the Duke of Ferrara, and he spent some years in his service. The death of his father left him to support the family, and compelled him to give more time to the service of his patron, but meanwhile he was producing his great poem *Orlando Furioso*, a work at which he toiled for some ten years. Its appearance made him famous. His patron alone treated the poem with contempt, and soon dismissed Ariosto from his service. The Duke of Ferrara then became his patron, and made him governor of a small district. After three years of successful rule he returned to Ferrara, where he lived till his death in 1533. Besides his great poem, he wrote a number of comedies and satires, and a theater was built for the playing of his pieces. The *Orlando Furioso* still stands in Italy at the head of all poems of chivalry, and has been translated into many languages. The plot is taken from the wars of the time of Charles the Great.

Aristi′des (*är′is-tī′dēz*), called the Just, was one of the statesmen of Athens, and helped to build up the greatness of his city. At the battle of Marathon, 490 B. C., he was one of the ten generals of the Athenians. He persuaded the others to give up their day of command to Miltiades, who was the most skillful commander. His rival at Athens was Themistocles and the contest between the two leaders grew so bitter, that it was deemed best to exile one of them by vote. When the vote was being taken, a man who did not know Aristides asked him to write for him the name Aristides on the shell which was used as a ballot. "Has he done you any injury?" asked Aristides. "No," was the reply, "but I am tired of hearing him called 'Aristides the Just.'" Aristides was banished for ten years; but in 480, when his country was in great danger from the Persians, he returned on the eve of the battle of Salamis, and helped his rival Themistocles. He also commanded the Athenians at the battle of Platæa. When many of the states decided to form an alliance against Persia, with Athens at its head, Aristides, because of his well-known honesty and fairness, was chosen to make the arrangements and to assess the expenses of the war on the different states. He died so poor about the year 468 B. C. that he was buried at the public cost; but he had done so much for Athens that the government gave his daughters dowries and his son a landed estate.

Aristophanes (*är-is-tŏf′a-nēz*), the greatest Greek writer of comedies. Little is known of his life, although his writings have made him famous. He was born at Athens, probably about 448 B. C. He began writing when very young, and his first plays were brought out under another name, because he was not old enough to contend for the prize. He wrote, in all, fifty-four comedies, but only eleven have come down to us. *The Knights* and *The Clouds* are among his most admired pieces. Others are *The Wasps*, *The Birds* and *The Frogs*. Aristophanes laughed at everything and everybody, especially at everything new. He liked old Athens, "as it had been in the days of the Persian wars," and thus failed to see the good in men like Socrates. One of his finest plays, *The Clouds*, is a satire against Socrates. His plays have in them specimens of the most beautiful and finished poetry. He died about 380 B. C.

Aristotle (*är′is-tŏt-l*), the greatest of all the Greek philosophers, was born at Stageira in Thrace, 384 B. C. His father was a physician, and his own early education was in that direction. In his eighteenth year he went to Athens and became the pupil of Plato, who called him the "Intellect of the School." He stayed at Athens twenty years, until the death of Plato, 347 B. C., when he went to Atarneas in Mysia and afterward to Mitylene. In the year 342 B. C., he was invited by Philip, king of Macedon, to educate his son Alexander in Macedonia. When Alexander set out on his expedition to Asia, 334 B. C., Aristotle returned to Athens, where at the age of fifty, he opened a school called the Lyceum, from its nearness to the temple of Apollo Lyceius. His school and pupils were called the Peripatetics, from his habit of walking up and down in the garden while giving his lectures. After the death of Alexander, he was accused of impiety by the party in power. With the fate of Socrates before his eyes, he chose a timely escape and fled to Chalcis in Eubœa, where he died 322 B. C. Many of his writings are lost; of those that remain, his *Logic*, *Rhetoric*, *Poetics* and *Meteorologics* are the most important. He almost created the science of logic and also that of natural science. In philosophy no one can be named whose influence has been greater or more lasting.

Arithmetic has been greatly influenced by modern educational thought, the same as other studies. Until very recent years the principal change taking place in the study consisted in a growing willingness to omit topics that had no close relation to our own lives. For instance, topics now wholly omitted or neglected are the surveyor's table, apothecaries' weight and troy weight; G.C.D. and L.C.M. as special topics, complex and compound fractions, except those of a very simple nature; annual interest and most of compound interest; partial payments, except under the United States rule, and with problems involving common amounts, as a principal of $100 with payments like $10 and $25, rather than amounts like $251.42 and $19.79; profit and loss as a special topic; equation of payments; partnership; longitude and time, except problems based on the 15° scheme and a few others; and cube root. The conviction has been growing that there are too many quantitative matters intimately related to our lives to allow time to be spent on others that lack such relationship.

But more recently new topics have been accepted and other older ones have been receiving a new emphasis, according as such topics are intimately concerned with our welfare. For example, new topics or topics newly emphasized are insurance, stocks and bonds, government revenues and expenditures, the banking business and taxes. These are subjects for children studying somewhat advanced arithmetic. But a similar change is also affecting the problems for younger pupils. Problems dealing with actual situations are more and more in demand for all ages of pupils, such as those dealing with farming, fishing, lumbering, mining, manufacturing, transportation of goods, trade and facts of daily interest.

NUMBER GAMES FOR CHILDREN

Addition, Subtraction, Austrian Method

Everybody must know something about numbers in order to live well in the world to-day. Even the original Indians and savages in Africa knew something about numbers, and to-day all of us must know a great deal more.

We can not keep scores in games if we can not add. Since the numbers 1,2,3,4,5,6,7,8,9,0, make all our figures, it is well to play a memory game, and memorize the forty-five fundamental combinations of addition. It is easy to do if we copy them on paper and make a game of memorizing with some playmate. The first seventeen combinations we can learn very easily and quickly. Let's try. The first series is 1+1=2, 1+2=3, 1+3=4, 1+4=5, 1+5=6, 1+6=7, 1+7=8, 1+8=9, 1+9=10. Now we have nine of them learned already. The next eight are almost as easy. 2+2=4, 2+3=5, 2+4=6, 2+5=7, 2+6=8, 2+7=9, 2+8=10, 2+9=11. Now, having memorized these, let's try the next series. 3+3=6, 3+4=7, 3+5=8, 3+6=9, 3+7=10, 3+8=11, 3+9=12. You notice that, though the numbers are growing a little harder, as we proceed there is one less number to learn in each series. The next series is 4+4=8, 4+5=9, 4+6=10, 4+7=11, 4+8=12, 4+9=13. The fives run like this: 5+5=10, 5+6=11, 5+7=12, 5+8=13, 5+9=14. The sixes, which form the next series, have only four combinations not studied above. They are: 6+6=12, 6+7=13, 6+8=14, 6+9=15. The sevens have only three new combinations: 7+7=14, 7+8=15, 7+9=16. The eights have but two: 8+8=16, 8+9=17. Now, the last number is 9+9=18. When you are playing the game it is well not to write the answers on the cards or paper, but recite the answer, and have your playmate tell you if you are correct. In most schools you will learn these combinations during the first two years. The game method may help you now if you learn them from this book. You can learn subtraction by this table also. In any set of three numbers above, if you subtract one of the first two numbers from the third, you will get the other. For instance, 4+5=9. Then 9-4=5, or 9-5=4. You should learn subtraction at the same time you are learning addition.

Older students may wish to know the Austrian method of subtraction. One advantage of this method is that it dispenses with the necessity of learning any subtraction table. An example like 52-27 might be worked as follows

$$\left.\begin{array}{l}52=50+2\\27=20+7\end{array}\right\}\text{Add ten to each}\left\{\begin{array}{l}50+12\\30+7\\\hline 20+5\end{array}\right.$$

which leaves the difference the same. No number added to 7 will make 2. But 5 added to 7 makes 12. We have now increased 52 by 10, and we must add 10 to 27, so as not to change the difference. 3 (tens) and 2 (tens) are 5 (tens). Hence the difference is 25.

You probably are not having any trouble with multiplication, so we will consider

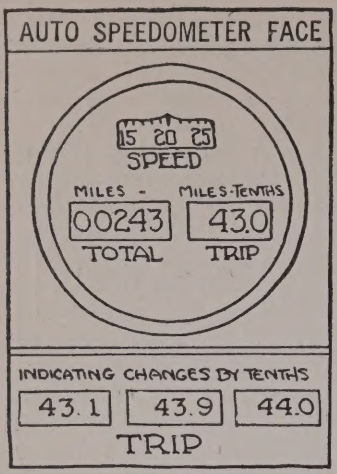
Fractions and Division

No one seems to have very much trouble with division, but fractions seem harder. Yet, truly, fractions are just another way of considering division. We think of division when we divide a greater number by a lesser, as 6÷3=2; and express by fractions when we divide a lesser number by a greater, as 3÷6, which we may write as $\frac{3}{6}$, which is a fraction, and means 3÷6. If we have one orange and divide it into four parts, so that each of four children may have an equal part, we are really doing this to an orange: 1 (orange)÷4 (pieces), which means that each child gets $\frac{1}{4}$ orange.

Let us look at the clock. From seven o'clock to eight o'clock is one hour. At fifteen minutes after seven a quarter or one-fourth hour has gone. We have divided the hour into four parts. And each fifteen minutes is equal to $\frac{1}{4}$ hour. There are three more fifteen-minute divisions in the hour, so there remains of the hour $\frac{3}{4}$ yet to come. Now let us go further. We know there are 60 minutes in an hour. Therefore we may consider one minute as 1 (hour)÷60, which is the same as saying that one minute equals $\frac{1}{60}$ (hour). Let us say the minute-hand has now reached 20 minutes after seven o'clock. If 1 minute equals $\frac{1}{60}$ hour, then 20 minutes equals $\frac{20}{60}$ of an hour. Let us change this large fraction into a fraction with smaller numbers and yet not change the value of the fraction. We can do it by dividing both the upper and the lower numbers by the same number. Dividing $\frac{20}{60}$ by 10, we get $\frac{2}{6}$. Dividing $\frac{2}{6}$ by 2, we get $\frac{1}{3}$. And as there are three twenties in sixty, one of the twenties is equal to $\frac{1}{3}$. So you see that twenty minutes after seven means that $\frac{20}{60}$ of the hour is gone, which is equal to $\frac{1}{3}$ hour. Thus $\frac{1}{3}$ equals $\frac{20}{60}$ or $\frac{10}{30}$.

Decimals

The decimal system is easy. Decimal means we are figuring by tens. We could call the decimal system the tens system, or the tenths system. Maybe your father can show you how the decimal system works on the speedom-



eter of an automobile. If you look at the face of the speedometer it will show some number, say 43.0. Notice the naught and the period before it. Now 43.0 means 43 miles. After you have gone a little way on the road the speedometer will read 43.1, which means you have gone 43 miles plus $\frac{1}{10}$ of a mile. So .1 means $\frac{1}{10}$, and .2 means $\frac{2}{10}$, and so on. When you have gone $\frac{9}{10}$ of a mile the speedometer will read 43.9. Now watch it when you go another $\frac{1}{10}$ of a mile. That would mean you have gone $\frac{10}{10}$ of a mile, and you know that $\frac{10}{10}$ of a mile means 1 mile. So the speedometer will go from 43.9 to 44.0; and then start over again on the tenths.

We may also learn decimals by making change. There are 100 cents in a dollar; so we shall have to think of divisions of a hundred, instead of ten as in the road problem. Here is what we do when we divide into 100 parts. Say we have nine cents. We write it as $0.09 (no dollars and nine cents). Now say we put two more cents to our nine cents. We write eleven cents this way $0.11. Now let us say that we have 95 cents to put with our 11 cents. That gives us a total of 106 cents. But 100 cents make a dollar; so let's take out a hundred of the cents and change them for a dollar. We do this by putting the dollars to the left of the decimal point. Instead of saying 106 cents, we say $1.06. You remember the speedometer went from 43.9 miles (which can be written 43.90 miles) to 44.00 miles. Well, our dollars work the same way. If we had $43.90, and added 10 cents, we would have $44.00. Now you make change with your father, and he will tell you whether you do it correctly.

Figuring Interest

When you put some money in a bank, you should know how much interest you are going to get. Here is the way to figure it. Say that you put $6.82 cents in the bank. The bank, say, pays four per cent. interest; that is, it pays you four cents a year for each dollar you give the bank to use, and when you take your money out you get all you put in plus the interest the bank gives for the use of the money.

Now, four cents, or four per cent., is written .04. Then multiply the amount you put in the bank, $6.82 by .04. This way:

$6.82
.04
.2728

You place the period before the 2 in .2748 because you must have as many numbers to the right of the decimal point in the answer as there are numbers to the right of the decimal points in the figures 6.82 and .04, or four numbers. Now .2728 means twenty-seven cents and $\frac{28}{100}$ of a cent. $\frac{28}{100}$ is less than one-half a cent; so you will not count it.

There is one rule in simple interest that is easily learned, and helps a lot. It is called the "six per cent., sixty-day rule." Interest on any amount at 6% for 60 days is found by moving the decimal point two places to the left of the amount on interest. For instance, if you have $23.45 on interest at 6% for 60 days, the interest for the 60 days would be .2345, or twenty-three and forty-five hundredths cents. Interest on the same amount of money for a year can be found by multiplying the interest for sixty days by 6.

Common Austrian Division Method

Our older readers may be interested in learning the Austrian method of division, as they were the Austrian method of subtraction given above. Here is the old method; with sample problem:

2.5)6.275(2.51
50
127
125
25
25

"Point off as many places in the quotient as the number of decimal places in the dividend exceeds that in the divisor."

Here is the Austrian method:

2.51
25)62.75
50
127
125
25
25

Dividend and divisor having been multiplied by such a power of 10 as makes the divisor a whole number, the decimal point in the quotient simply goes above that in the dividend.

Mathematics Curriculum

While the school systems of different states vary, in general the milestones in arithmetical progress mark, approximately, the divisions given below.

First half year: Count to one hundred, read and write to one hundred, memorize about twenty of the forty-five combinations in addition the sum of which does not exceed nine; give much of the work in oral form. During the second half year addition and subtraction in their simplest forms are given, and a few measures learned. Second year: Drill in the work taught the first year, numbers are enlarged, and about forty-five combinations in multiplication memorized. Third year: Review of the previous two years' work, with added feature of rapidity; introduction of geometric forms, also the idea of area, "carrying" in addition, and multiplication and division. Fourth year: Common fractions of business, decimals and money, and visualized standards of measure Fifth year: Review of integers is given, the number space becomes unlimited, and decimal fractions completed. Sixth year: Work is given in percentage, discount, simple interest, profit and loss; practical business problems will assist in making the course interesting. Seventh year: Percentage is continued; new work includes ratio and proportion, and the roots; the introduction of x for the unknown quantity is helpful, and ushers in algebraic ideas; the metric system should be known. Eighth year: Attention is turned especially to arithmetical applications to business, with advanced measures, banking, partial payments, partnerships, taxes, and corporations. Many European school systems introduce algebra and geometry in the seventh and eighth grades, and some city schools in the United States are approaching this standard. The trend is toward the extention of this practice.

See ALGEBRA; CALCULUS; GEOMETRY.

Arizona (*ăr-ĭ-zō'nȧ*), a southwestern state of the United States, and fifth largest in the Union. It is bounded on the north by Utah, on the east by New Mexico, on the west by Nevada and California, and on the south by Mexico. It extends over an area of 113,956 square miles, 146 miles of which are water.

Surface. Arizona is nearly rectangular in shape. The northern part of the state is a vast plateau, 45,000 square miles in extent, ranging from 4,000 to 7,000 feet above sea level. Lava ridges and extinct volcanic peaks mark this plateau. Deep canyons cut its edges and through it runs the Grand Canyon, deepest of the mighty series of canyons, walled with marble and granite, through which the Colorado River cuts its way. To the south the surface drops off to a region of parallel mountain ranges, the chief mineral belt of the state. Here the plateau averages only 2,000 feet above sea level. The Gila River, 605 miles long, with its tributaries, the Salt, the Verde, and Little Colorado, entirely crosses the southern part of the state. The Colorado is 2,000 miles long, and drains all Arizona into the Gulf of California. The Grand Canyon, rising to 6,500 feet above the river, is one of the most remarkable scenic beauties of the world. San Francisco Peak, in Coconino County, marks the highest point in the state.

Climate. Arizona, having a dry atmosphere, is very healthful. The summer climate of the plateau, where the average temperature is fifty degrees, is delightful, as is the winter temperature of the lower valleys. The average temperature of the Arizona desert regions is about seventy degrees. There are summer rains during July, August, and September, and winter rains from November to March. Although the sandy region around Yuma is the hottest district north of the Isthmus of Panama, the dry atmosphere keeps the summer's heat from being very oppressive and makes the winter climate delightful.

Minerals. Arizona is rich in minerals, and mining is the chief occupation. The state ranks as one of the chief copper producing regions in the world. The most famous copper mines in the state are the United Verde mines. From 1845 through 1930, Arizona produced 40.9 per cent of all the copper produced in the United States. In 1932, the gold production was valued at $1,378,100 and silver at $602,707. In that same year there were 4,170,000 pounds of lead produced. Next in order of importance is zinc. Some of the rarer metals have been found, and there are large deposits of gypsum, much cement material and limestone. Great deposits of coal lie idle on the Indian reservations. Fine specimens of opals, garnets, chalcedony, sapphires and turquoise are found. Onyx is quarried for interior decorations and the furniture trade.

In Navajo County is a wonderful chalcedony forest. The cracked trunks of this petrified wood are sometimes four feet thick, and show the most exquisite of colors. This forest is now a part of the national park system of the United States.

Production and Industry. Arizona is chiefly a mining state, and the leading industry is the smelting and refining of copper. In 1932 the smelter output totalled 203,136,000 pounds. Other manufacturing interests are centered in the shops for repair of railway cars and locomotives. According to the most recent census of manufactures, there are 347 establishments which employ 10,500 employés. The output for 1930 was valued at $199,370,650. The mountain areas of Arizona are covered with forests of pine, cedar and other valuable timber, while the cottonwood follows every stream. In the vicinity of the San Francisco Mountains the lumber industry is quite important. In this and other sections the government has set aside vast timber tracts.

Agricultural development has been greatly retarded by the lack of water. The valleys are very fertile, and the desert soil has responded to irrigation with abundant crops. The extension of irrigated areas, construction of government reservoirs, projects such as the Roosevelt Dam, one of the two greatest dams in the world and which irrigates 250,000 acres in the Salt River Valley, the Laguna Dam, and the hydroelectric projects at Horse Mesa, Stewart Mountain, and the Gila River, give promise of what can be accomplished in the arid regions. The principal products are wheat, barley, alfalfa, apricots, citrus fruits, cantaloupes and olives. Experiments have been conducted in the cultivation of Egyptian cotton, thus utilizing the arid lands of the south. In 1930, 10,526,627 acres were under cultivation. Of this area, 577,263 acres were irrigated. In 1932 there were produced 82,000 bales of cotton; 609,000 bushels of wheat; 615,000 bushels of corn; 618,000 boxes of citrus fruits. In 1933, the cattle in the state numbered 894,000, the sheep, 1,003,000.

Population. According to the census report of 1930, Arizona had a population of 435,573, an increase of 30.4 per cent over that of 1920. The large Indian population, which totalled 43,726 in 1930, is composed of Apaches, Navajos and Hopis, and is exceeded only by the Indian population of Oklahoma. These tribes dwell on reservations occupying 18,653,014 acres of land. Approximately 60.7 per cent of the state's population is white, and 26.2 per cent Mexican. Throughout the state are to be found Chinese, Japanese, Filipinos and Negroes. The most important cities with their populations in 1930, are Tuscon, 32,506, and Phoenix, 48,118, the capital of the state and center of the rich agricultural district, the Salt River Valley.

Education. There is still a high percentage of illiteracy in Arizona although it had decreased from 15.3 per cent in 1920 to 10.1 per cent in 1930. Only 0.5 per cent of the native whites are illiterate, but because of the large Mexican and Negro population it is difficult to erase illiteracy to any great extent.

Education is compulsory in the state between the ages of eight and sixteen. Free instruction is provided for pupils from six to twenty-one years of age. In 1931 there were 382 district elementary schools and fifty-six public high schools in the state. In 1930-31 the total expenditure for public schools amounted to $11,932,593.

Teachers' colleges are maintained by the state at Tempe and Flagstaff, Lowell Observatory is also situated at Flagstaff. It was here that the discovery of the ninth planet in the solar system, a trans-Neptunian planet named Pluto, was announced on March 13, 1930. The University of Arizona, organized in 1885, is situated at Tucson.

Government. The first State legislature placed the government under the direct control of the people through the Initiative, Referendum, and Recall. The governor is elected for two years. The State Legislature consists of a Senate of nineteen members, and a House of Representatives of sixty-four members. Arizona is divided into fourteen counties. It is represented in the National Congress by two Senators and one Representative. The capital of the State is Phoenix.

History. An Italian friar and a freed slave visited Arizona in 1539, finding traces of a great and populous race of Pueblo or Aztec stock. The first settlement was made in 1580. The Jesuits followed, but Apache raids in 1828 swept away their work. The United States was ceded that part of the state north of the Gila River, by Mexico in 1848; the remainder was secured by the Gadsden Purchase in 1853. Arizona was a part of New Mexico until 1863, when it became a separate territory. On February 4, 1912, this territory was admitted into the Union as a state.

See APACHES; COLORADO RIVER; GRAND CANYON; INDIANS; IRRIGATION; NAVAJOS; PHOENIX; TUCSON.

Arkansas (*är'kăn-sô*), a south central state the name of which was derived from the Arkansas Indians. It is frequently termed the "Bear State." Arkansas is bounded on the east by the Mississippi River, on the north by Missouri, on the south by Louisiana, and on the west by Texas and Oklahoma. It extends over an area of 53,335 square miles, 810 square miles of which are water.

Surface. The surface of the state varies from the lowlands of the Mississippi Valley, extending along the entire eastern boundary, to the mountainous elevations of the Ozarks in the west. The central and greater part of the state is mostly level and rolling. Magazine Mountain in Logan County, and Blue Mountain in Polk-Scott County, are the highest points in the state, both reaching an elevation of 2,800 feet.

The chief rivers flowing through the state are the Arkansas, White, St. Francis, which empty directly into the Mississippi and the Ouachita (wŏsh'ĭ-tô), which winds through the southwest corner, and other tributaries of the Red River. In the higher regions they are swift and afford excellent water power for mills. Much of the traffic of the State flows down the Mississippi, although river navigation is giving way to a well-developed railroad transportation. There are many lakes, which, with the rivers, abound in fish.

Climate. The climate of Arkansas is equable, although the winters are often rigorous in the mountain regions. Snow rarely falls south of the Ozarks. In the lowlands the infectious malaria is most prevalent and the climate somewhat unhealthful. Some of the finest springs in the United States are found in Arkansas. Hot Springs, a national reservation of 911 acres in Garland County, are world famous and visited annually by thousands of tourists and sufferers of rheumatism and other diseases which are benefited by the mineral waters. Potash Sulphur Springs, White Sulphur Springs, Eureka Springs and Mammoth Springs are among the other well-known springs in Arkansas.

Minerals. The State is richly endowed with minerals especially in the regions about the Ozarks and in the south. In the northwestern part of the State are vast beds of bituminous coal. There are large zinc mines in the north, the quality of the ore being of very high grade. Bauxite is found in the southern part of the State and is exported in large quantities. Arkansas produces ninety-six per cent of the bauxite of the country. In 1932, 89,779 long tons were produced. Large deposits of manganese are to be found in several counties. The finest oil stones and whetstones in the world come from Ouachita Valley. Diamonds were discovered in Murfreesboro in Pike County in 1906. Since that year more than 10,000 diamonds have been found, the best of which weighed 40.23 carats. Vast beds of the finest quality of slate are located in the western part of the State. An excellent quality of clay, suitable for pottery and tiling, is widely distributed in the southwest. Platinum was first discovered near Batesville in 1920. In 1921 petroleum was discovered in and about El Dorado in Union County. In 1932 the petroleum production amounted to 11,907,000 barrels.

Included among the State's other important minerals are iron, antimony, novaculite, salt, lime, sandstone, ochre, phosphates, natural gas and chalk. The quarries furnish practically inexhaustible supplies of marble and building stones. A superor quality of onyx is found in Carroll County.

Production and Industry. Arkansas is primarily an agricultural state. Its fertile river-bottoms yield immense crops of cotton and corn. In the North, wheat, oats, sorghum, potatoes, sweet potatoes, hay and forage crops are grown. In the South, cotton and tobacco are the principal crops under cultivation. In 1930 there were 242,334 farms throughout the State. The total farm area was 16,052,962 acres, 7,907,000 acres of which were crop land. Cotton is the principal crop of the State. In 1932, there were 3,530,000 acres of cotton which yielded 1,260,000 bales. A few years ago the United States government began experiments in the culture of rice on the prairies east of Little Rock. The success of the venture has been marked. The land is irrigated from pumps sunk to a depth of less than 200 feet, where an abundant water-supply is found. In 1932 there were 150,000 acres of rice from which 6,900,000 bushels were produced.

Fruit-growing is an important industry and the fruit produced—apples, peaches, pears, grapes, plums and prunes—are of the finest quality. This industry is carried on chiefly in the northwestern part of the State. The extensive prairies furnish excellent facilities for raising cattle, sheep, and horses which are exported in large quantities. In 1932 the livestock in Arkansas comprised 132,000 horses; 332,000 mules; 518,000 milch cows; 848,000 cattle; 59,000 sheep; and 832,000 swine.

The manufacturing interests of the State are being steadily developed. The cutting and working of timber is undoubtedly the most important industry. Some of the largest lumber mills in the South are located here. The forests of Arkansas cover large areas and furnish vast supplies of pine, cypress, and hardwood of many varieties. In 1931 the lumber cut totalled 507,715 M board feet, half of which was hardwood. Immense stave and hub factories may be found in the northeastern part of the State. The manufacture of sash, doors, blinds and furniture is quite important. The manufacture of cotton-seed products ranks second among important industries in Arkansas. In 1930 there were 1,731 manufacturing establishments in the State in which 44,073 persons were employed.

Transportation. Many of Arkansas' rivers are navigable and river navigation is still important, especially in the transporting of the principal exports, cotton and lumber. Railroad transportation, however, is becoming increasingly important. In 1931 there were 4,812 miles of steam railway and 122 miles of electric railway in the State. There were 8,705 miles of State highways, 7,283 miles of which were surfaced.

Population. According to the census of 1930 the population of Arkansas was 1,854,482, an increase of 102,278 or 5.8 per cent over the population of 1920. The native whites numbered 1,364,733 or 73.6 per cent of the population. The foreign-born white population (10,173) represented 0.5 per cent of the entire population. This element was comprised of 2,989 Germans; 952 Italians; 800 English; 454 Irish, and 695 Canadians. Of the total population 20.6 per cent were urban, and 25.8 per cent were Negroes. The principal cities, with their populations in 1930, are Little Rock, the capital, 81,679; Fort Smith, 31,429; Pine Bluff, 20,760; and Hot Springs, 20,238.

Education. Since the adoption of the constitution of 1874, education has been steadily advancing. In 1910, 12.6 per cent of the population ten years of age and over were illiterate. In 1920 illiteracy was 9.4 per cent and in 1930 that rate had decreased to 6.8 per cent. There were 60,102 (16.1 per cent) illiterate Negroes in the State in that year. Separate schools are maintained for white and negro children, but the laws contemplate that there shall be no difference in the character of the educational facilities offered. In the negro districts the negro race is represented on the school boards and the attendance is as regular as that of the white schools. In 1930 the school enrollment was 449,117, while the school population was 677,542. Public school expenditures in 1930 amounted to $14,147,283.

The University of Arkansas at Fayetteville, which was founded in 1872, had an enrollment of 1,868 students in 1933 and 175 instructors. A State Teachers College was established at Conway in 1907. Philander Smith College, a school for Negroes, is situated at Little Rock. There are many denominational institutions of higher learning throughout the State, the majority of which are Baptist and Methodist schools.

Government. Arkansas is divided into seventy-five counties. The state constitution was adopted in 1874. Its General Assembly is composed of a Senate of thirty-five members, elected for four years and partially renewed every two years, and a House of Representatives of 100 members elected every two years. Sessions of the Assembly convene biennially and are usually limited to sixty days. Arkansas is represented in the National Congress by two Senators and seven representatives. The capital of the State is Little Rock.

History. DeSoto probably first saw Arkansas. The first settlement was made in 1868 at Arkansas Post by the French. This territory was a part of the Louisiana Purchase, became part of the Louisiana Territory in 1803, and of Missouri Territory in 1812. With what is now Oklahoma, it became Arkansas Territory in 1819. It was detached in 1836, and admitted into the Union as a slave state on June 15 of that year. In May, 1861, the state seceded. Several battles were fought within its boundaries and it was occupied by Union forces in 1863. It was readmitted to the Union in 1868, and suffered much during the "Carpet Bag" administration that followed. The present constitution was adopted in 1874, and the period of unrest came to a close. The Mississippi Valley flood in 1927 was most destructive, as was the devastating drought of 1930. Good weather and good crops restored normalcy by the close of 1931.

See Fort Smith; Hot Springs; Little Rock; Louisiana Purchase; Pine Bluff; Reconstruction.

Arkansas (*är-kăn'zȧs*) **City,** a city in Cowley County, Kansas. It is situated at the junction of the Walnut River with the Arkansas River about fourteen miles south of Winfield. A canal uniting these two streams furnishes the city with water-power for manufacturing purposes. Arkansas City is an important distributing point for the military posts and ranches in the vicinity. Its trade consists largely of agricultural implements, windmills, wire and mattress factories, flour, oil, lumber mills, and grain. The city is served by the Atchison, Topeka & Santa Fe; the Missouri Pacific, and the St. Louis & San Francisco Railways. In 1930 the population was 13,946.

Arkansas (*är'kăn-sô*) **River,** a river of the United States, and next to the Missouri, the longest tributary of the Mississippi. It rises in the Rocky Mountains, and joins the Mississippi at Napoleon, about 300 miles above New Orleans. After breaking through the Colorado cañons, it flows through Kansas, Oklahoma and Indian Territory, and cuts Arkansas into nearly equal parts. It is 1,460 miles long and is navigable to Fort Smith and, in high water, to Fort Gibson, 462 miles. The Canadian River, which rises in northeastern New Mexico, is its most important tributary.

Arkwright (*ärk'rīt*), **Sir Richard** a distinguished English inventor. On a stormy night in the year 1765, a foot-traveler knocked at the door of a thatched cottage in the village of Stanhill, Lancashire, England, and asked for shelter from the weather. The light of a candle and the whirring of a wheel guided him to that dwelling rather than to any other of the group. A cotton-spinner was there lengthening his day of toil, while his neighbors slept. At the knock the candle was blown out and the noise stopped. After a moment a voice asked:

"Who knocks?"

"Dick Arkwright."

"A spinner?"

"No, a barber and hair buyer from Bolton. I can pay for a lodging for the night."

When the stranger was admitted and the candle had been relighted, there was disclosed a strange spinning-wheel with eight spindles. The host was James Hargreaves, and this was his newly invented spinning jenny which he used secretly because his ignorant neighbors, fearing such a machine would make work scarce, had destroyed his first model. In the itinerant barber he feared no rival, and he found a sympathetic listener. From this chance encounter of two poor, unlettered laborers resulted inventions that made England the greatest cotton-manufacturing country in the world, and revolutionized the methods of the industry.

Richard Arkwright was at that time thirty-three years old. He was born in Preston, Lancashire, a seaport town north of Liverpool, in 1732, the youngest of thirteen children of a poor laborer. At the age of ten he was apprenticed to a barber in Bolton, and for twenty years his life was passed in a cellar shop, shaving workingmen at a penny a shave. It is doubtful if he could read and write, "nevertheless," as Thomas Carlyle says of him, "the man had notions in his own rough head." His discovery of a method of preparing and dyeing hair for the wig-maker, lifted him out of the cellar-shop and into the highway. Hair-buying took him among the poorest workmen in the cotton spinning district. As he went from hamlet to hamlet he heard talk of the need for a better and more rapid method of spinning. The yarn was not only insufficient in quantity but was so poor in quality that flax had to be used for warp. The all-cotton fabrics had to be imported from India, and were very expensive. Arkwright saw that Hargreave's jenny could spin eight threads at once, but that the yarn was still inferior.

He had once been through a rolling mill and seen iron bars lengthened and strengthened by being forced through rolls. Why not apply the process to cotton? He had a little money laid by, but he had no knowledge of mechanics. So he employed a clock-maker to construct his machine. The first part of it consisted of two sets of rolls turning on each other like those of a clothes wringer. One roll of each pair was of steel, finely ground, the other was covered with leather. The filaments of the cotton plant were drawn through the grooves, spun and compressed. Spindles then took the yarn and stretched and twisted it. Fearful that the spinning frame he had invented might be destroyed, he took it to Nottingham and began to use his yarn in hosiery mills. He obtained his first patent the same year, 1769, that Watt secured his on the separate condenser stationary engine. And Arkwright was one of the first to operate a factory by steam power. He made the first all-cotton fabrics produced in England. His wonderful invention inspired the jealousy of rivals, his patents were attacked and declared void, and he was compelled to pay duty by having his goods classed as East Indian calicoes. His spinning frame was copied with impunity. However, they "couldn't copy his mind." In 1775, Arkwright took out new patents on machines for equipping an entire textile factory. It is said that no other patent ever issued was so comprehensive, and covered so many distinct mechanical inventions, all necessary to the processes of one industry. It covered every stage of manufacture from the raw fibre to the finished fabric ready for the merchants' shelves, and provided for various weaves and mixtures of cotton with wool, silk and flax.

Many biographers have scant appreciation of the man, while admitting his genius and the value of his inventions. He won a fortune and a knighthood, and he educated himself to fit his new station in life, employing private tutors and giving an hour each day to study after he was fifty years old. His force of character and executive ability are shown in his organizing the factory system. Before Arkwright's time spinning was a cottage industry, and much of the weaving was also done in private houses. The workmen labored irregularly, and the product was far from uniform in quality. Arkwright brought his workmen under a factory roof, compelled cleanliness, order and regularity of hours, and established standards in quality and quantity of fabrics produced. His cotton factory at Crawford became the model system which other plants that were to prosper had to adopt. He put into practice the principles of industrial economy that Adam Smith taught—the saving accomplished by organized, disciplined division of labor.

See SPINNING.

Arlen, Michael, a distinguished British novelist, was born in 1895 at Ruschuk, Bulgaria, on the Danube, the son of Armenian parents. His name was originally Kouyoumdkian Dikran. When he was a small child his parents removed to England where he was educated at Malvern College. He later studied medicine at Edinburgh University. After a sojourn in Switzerland he returned to London and devoted himself to the writing of popular fiction. At the age of eighteen he produced *The London Venture,* a book he terms his book of confessions. Young Arlen mingled freely with the fashionable London set, and about this time in his life came the break with his family. His works depict the life of his associates. Within the next few years he produced *The Romantic Lady,* a group of short stories, and *These Charming People,* another collection of short stories. It was at this time that Michael Arlen wrote his first novel, *Piracy,* a publication which was of great financial help to him. In 1924 he produced *The Green Hat,* an overwhelming success which brought the young novelist into the limelight. In 1925 *The Green Hat* was dramatized, Katharine Cornell playing the rôle of the heroine, Iris March. This production was later produced in motion pictures in which Greta Garbo played the leading rôle.

In May, 1928, occurred the marriage of Michael Arlen to Countess Atalanta Mercati, the daughter of Count Mercati of Athens, Greece. The mother of the Countess is an American. A son, John Michael, was born to the Arlens in the latter part of 1930.

Among the most recent of Michael Arlen's books are *May Fair,* a collection of short stories, (1925); *Young Men in Love,* a novel which Arlen himself regards as a distinct failure (1927); *Lily Christine* (1928); *Babes in the Wood* (1929), a group of short stories bearing the subtitle, "a relaxation intended for those who are always travelling but never reaching a destination"; and *Men Dislike Women* (1931), which the novelist considers the best of his novels. Some time before *The Green Hat* was produced, Michael Arlen spent a year writing a novel which he called *The Dark Angel.* He was so displeased with the work, however, that he destroyed the manuscript. This prominent novelist will always be remembered by the world of readers, and theatre-goers as the author of that great success of 1924, *The Green Hat.*

Arlington National Cemetery, the resting place of many prominent Americans and of thousands of men who fought in the Civil, Spanish-American, and World War, is situated about five miles northwest of Alexandria, Virginia. It lies across the Potomac from Washington and may be plainly seen from the nation's capital. The site was formerly the property of George Washington Parke Custis. General Robert E. Lee came into possession of the place, but during the Civil War it was seized by the Government. This cemetery contains the grave of the "Unknown Soldier of the World War." A bridge spans the Potomac from a place near the Lincoln Memorial, in Washington, to the cemetery, where roads lead to the Lee mansion and Mount Vernon. Simple adornments of this most beautiful bridge represent the United States Government and the union of the North and South. In 1932 the Arlington Memorial Bridge over the Potomac at Washington was opened which is a link in the Mount Vernon Memorial Highway.

Arlington, a city of Middlesex County, Massachusetts, is situated about six miles northwest of Boston. It is served by the Boston & Maine Railroad and an electric railway which connects it with Boston. Arlington is an attractive residential town wth numerous fine buildings and an especially well-equipped public library. Its principal industries are market gardening, ice-cutting and ice-tool manufacturing. The city was first settled in 1650. Its present name was adopted in 1867. In 1930 the population was 36,094.

See MASSACHUSETTS.

Armada (*är-mä'dȧ*), **The Spanish**, the great expedition sent out against England in 1588 by Philip of Spain. England was at this time the bulwark of the Protestant faith, and for this reason Philip, who was the great Catholic champion, desired to crush Protestantism by conquering England, which Pope Sixtus V had given over to the Spanish crown. For many months the Spanish nation used all its energies in gathering a mighty force, and in July, 1588, the fleet of 150 vessels, carrying over 19,000 soldiers and 8,460 sailors, besides slaves as rowers, and armed with 2,431 cannon, set sail from Spain, under command of the Duke of Medina-Sidonia. His project was to sail through the Channel and pick up at Flanders the Duke of Parma, who was lying in wait there with 35,000 men. Forces were then to be landed on a different part of the English coast, while the Armada kept the Channel clear.

Meanwhile, the English had not been idle. Drake, by a bold dash at the Spanish fleet in the port of Cadiz, had delayed the attack, and when the news came that the great fleet was about to sail, forces gathered around the Earl of Leicester to oppose the landing of Parma, while the best mariners of the age, Drake, Hawkins, Frobisher and others gathered around the English Admiral Howard. They took their station at Plymouth, and, as the Spanish fleet sailed up the Channel, in the form of a crescent, seven miles long, the English took their place to windward. The next day the Spaniards attacked, but the English ships were managed with such skill that no harm could be inflicted. Dismayed at their failure, the "Invincible Armada" stood off up the Channel, pursued and harassed by the English, and cast anchor at Calais. From here they were driven by means of fireships out into the open sea, a large number of ships were destroyed and almost the whole fleet was forced on the coast of Flanders. The hopes of the Spaniards were now broken, and they resolved to give up the expedition. Rather than go back through the vigilantly guarded lines of their persistent enemies, they set out on the perilous voyage by the North Sea. The fierce northern gales, however, scattered the fleet and drove them on the coast of Ireland and Scotland, where those escaping from the wreck were killed by the natives. Of the vast Armada only a shattered remnant of fifty-four vessels, with about ten thousand men, reached Spain.

See Drake, Sir Francis; Elizabeth; Frobisher, Sir Martin; Navy; Newfoundland; Philip II.

Armadillo (*är-mȧ-dĭl'ō*), a curious animal of burrowing habits of the sloth family which is confined chiefly to Mexico, Central and South America. One species, the peba, is frequently found as far north as Texas. The armadillo is covered by an armor of bony plates, scutes, which are so jointed, that when annoyed, the animal can roll itself into a ball for protection. Its legs are extremely short, but it is said that the animal can outrun a man and can bury itself in an incredibly short time by the use of its long, powerful claws. The largest species is about thirty inches in length and the smallest is but six inches long. It is usually of a brownish-black color marked with yellow. It is an habitual digger, makes its burrows in the dry soil of arid regions, and comes abroad chiefly at night. It feeds on insects, worms, roots, fruits and sometimes carrion. The flesh of the armadillo is very good food. In the woods and pampas large numbers of these animals are found.

The poyou (*poi'ōō*) is found chiefly in Argentina and is distinguished by its six movable bands of plates. The tatouay (*tăt'ōō-ā*) is native to tropical South America. This species of armadillo has twelve or thirteen movable bands around its body while its tail, which has but few plates, is shorter than the body. The third claw of the tatouay is quite large and falcate. The peba (*pē'bȧ*) has nine movable bands of scutes. There are several varieties of the peba scattered from Texas to Paraguay.

Armature (*är'mȧ-tūr*), pieces of laminated soft iron or other magnetizable substance placed as the "Keepers" at the extremities of poles of magnets to preserve their magnetic power, by completing the magnetic circuit through the two poles when the electric current is sent through their coils. The armature in a dynamo is the coil of wire in which the current is generated.

Armenia (*är-mē'nĭ-ȧ*), or the **Armenian Socialist Soviet Republic,** forming with Azerbaijan (*ä-zĕr-bä-ē-jän'*) and Georgia the Transcaucasian Socialist Federated Soviet Republic (T.S.F.S.R.), a part of the Union of Socialist Soviet Republics (or Soviet Russia). It is a high, fertile, mountainous tableland situated in northeast Asia Minor. It is bounded on the north by Georgia, on the east by Azerbaijan, and on the south and west by Turkey. The country is chiefly agricultural, with a generally healthful climate. It is drained by the Tigris and Euphrates rivers. Mt. Ararat is the chief mountain peak, rising to a height of 17,090 feet. Armenia has an area which extends over 11,945 square miles. The population, according to the census of 1931, was 1,032,700. The capital is Erivan (ĕr-ē-vän'), which it has been estimated has a population of 75,000.

Armenian history is lost in antiquity. Since the time of Herodotus, the country has been known as Armenia, originally the name of a single obscure clan, descended from Aram, who traced his ancestry back to Japhet, son of Noah. After being ruled by their own kings, the Armenians fell successively subject to the Assyrians, Medians, Persians, Macedonians, and Romans. The independence of Armenia dates from the sixth centry B. C., and was restored by Dikran (or Tigranes I) of the Haikh dynasty. When Alexander the Great conquered the country, the last Haikh king was killed. While Antiochus the Great was fighting the Romans, from 223 to 190 B. C., the governors Artaxias and Zariadres again declared independence, but this dynasty was short-lived. Armenia was conquered by the Parthian Arsacidæ, but Tigranes the Great, powerful monarch, lost it to the Romans in 63 B. C.

During the early years of the Roman Empire, from 29 B. C. to 395 A. D., Armenia was constantly an object of intrigue and struggle between Parthia and Rome. These years were punctuated by continual wars upon and cruel persecutions of the Armenians. By the eleventh century the Greeks had siezed part of the territory, and the Turks and Kurds had conquered the rest. In 1242, the Mongols were in possession of Armenia. After they had devastated the country, the hosts of Tamerlane followed. The Ottoman sultans and the Persian Shahs fought over the land for its possession. Since the fourteenth century, the only vestige of former independence has been the magnificent ruins and the indomitable spirit of a people oppressed both for their race and their religion.

Armenia had adopted Christianity as a state religion, and was its chief bulwark in Asia. But the oppressive rule of the Turks advanced Mohammedanism. In 1828, the country was divided between Turkey, Russia and Persia. Since that division, Turkish atrocities against the Armenians have repeatedly startled the entire world. The Christian Armenians were secure under the Russian rule, but the Mohammedans often rebelled. The Christians under Turkish rule, however, were persecuted alike by the Turks and the Mohammedan Armenians, especially as they had secretly formed organizations aiming at independence. Cruelties, known as the "Armenian Atrocities," began in 1894. In the months of October and November 1895, more than 30,000 people were massacred. A conservative estimate places the number of Armenians who perished under Turkish rule in 1896, at 200,000. Thousands of victims were added by massacres, chief of which were those at Adana in 1901, and at Samsun in 1904. 15,000 perished in the latter massacre alone.

The World War only added to these terrible persecutions, as Armenia became the battleground for Russia and Turkey. Nearly 800,000 Armenians perished by massacre and famine within five years. From 1914 to August 1916, the Russians conquered the greater part of Turkish Armenia, but the revolution in Russia caused their withdrawal. The Turks then reoccupied the country until they also had to withdraw to fight the British in Egypt, Palestine, and Mesopotamia.

Transcaucasia, the Russian province, declared its independence in February 1918, with the individually independent republics of Erivan (now Armenia), Georgia, and Azerbaijan, in a federal union which lasted only five weeks. Soviet Republics were established in Georgia in February 1921, in Armenia in April, 1921, and in Azerbaijan that same year. On March 22, 1922, the three Republics concluded an agreement whereby they formed a Transcaucasian Federation, and thus established the Transcaucasion Socialist Federated Soviet Republic by the end of that year.

Meanwhile, in the war between Turkey and Greece, lasting from 1920 to 1922, and fought in Asia Minor, the Armenians naturally espoused the Greek cause, bringing vengeance from Turkey, even in the republic which it refused to recognize. Finally, on October 13, 1921, a settlement was reached between Turkey and the Armenian Socialist Soviet Republic which conceded about half of Caucasian Armenia to the Turks. Large numbers of the Armenians in that territory migrated to the Armenian Republic, however, so that few are to-day under Turkish rule. Under the Soviet régime, Armenia has made rapid progress in every way.

See Azerbaijan; Georgia; Russia; Transcaucasia.

Arminius (*är-mĭn′ĭ-ŭs*), prince of the Cherusci, a German tribe, was born bout 18 B. C. When a boy he became a Roman citizen and served as a soldier in the Roman army. Coming home, he found the whole country stirred up by the cruelties of Varus, the Roman governor, and became the head of a conspiracy. He induced the Roman general to scatter his troops in small detachments saying that it would keep better order among the Germans. News of the conspiracy caused Varus to march into the interior. Arminius struck the match, the scattered Roman troops were murdered, and the main body was surrounded. They fought their way for three days, till they were killed almost to a man, Varus taking his own life. Rome was filled with shame. The Emperor Augustus kept crying for days: "Varus, give me back my legions!" Germanicus marched against the Cherusci, but accomplished nothing. The next year he marched again with 80,000 men and a fleet, Arminius artfully led him into narrow passes, then, falling upon him, cut off his cavalry, almost destroyed four legions and forced him to retreat. The next year the undaunted Germanicus came with 100,000 men and 1,000 ships. On a plain called No-man's Meadow a great battle was fought. The Germans were defeated, but the next morning they fought again and compelled the Romans to retreat. No Roman army ever again marched beyond the Rhine and Arminius is therefore justly called the *German Liberator*. He was assassinated in 21 A. D.

See Germany.

Armor, a protection once used for the warrior in battle. Armor of some sort was used by almost every nation from the earliest times until the gradual improvement in firearms made it useless. Except in very early times, when skin was used, armor has always been made of metal, usually brass or bronze. This was the sort used in the contest between Goliath and David, which is the most ancient allusion in history to armor. The armor of the Greeks consisted of a crested helmet, which could be drawn down so as fully to cover the face; a small breastplate worn so low as to leave the throat and neck exposed; a plated waistband from which hung a short kilt of cloth or leather covered with metallic plates; and greaves or a sheath of solid metal for the legs from knee to ankle. The shield was a round one, at first large enough to cover the entire body of the warrior, but later a small one was used of the same shape. The Roman soldier's armor was much the same, except that his shield was oblong, and he often fought without greaves. The earlier nations used armor made of overlapping scales of metal sewn upon leather fitting the whole body. They also clothed their horses with this armor.

But it was in western Europe, in the middle ages, that complete defensive armor was brought to its greatest perfection. The earliest armor was made of metal rings, then sewn closely together upon leather, or simply of rings woven together like the modern curb-chain. But this mail, as it was called, could be driven by a hard blow into the flesh, and so, piece by piece, plate armor was adopted. For 200 years this change went on, until, by the time of the reign of Henry VII of England, the best and most beautiful armor ever wrought was worn. The whole suit of armor, completely covering the body, was fluted, the helmet fitted the head, and, with the plates guarding the neck, adapted itself to every movement. Every part of the body was protected, and yet motion was comparatively free. The shields were of various shapes. The heads and bodies of the horses were also protected by solid steel. So hard was it to pierce these splendid suits of armor, that at one time two armies in Italy fought from 9 o'clock in the morning until 4 o'clock in the afternoon, without a single person being killed or wounded. After firearms were invented, armor was discarded by all nations except Germany until the World War. Helmets were also worn by soldiers of the Allies, and protective shields were employed by sappers in creeping up to cut barbed wire entanglements. Warships are also protected by armor-plates.

See NAVY; WORLD WAR.

Armor-Plate, the metallic sheathing of a ship-of-war or of a fortification, used as a protection against artillery fire. It is claimed that John Stevens of Hoboken, New Jersey, was the first to suggest the use of armor, but the first practical use was in 1855 by the French on their ships-of-war. Armor-plate manufacture has gone through several stages. The first plates were made of wrought iron, but the invention of rifled cannon made it possible to pierce any single thickness of wrought iron that could be then made. In 1873 C. Cammell & Co. invented the compound plate, which was prepared by pouring liquid steel on to hot iron plates. Then Schneider & Co., of Creusot, France, demonstrated that steel plates are preferable. About 1890 experiments made by the United States government at Annapolis showed that a plate made of an alloy of steel and nickel is far superior to the simple steel. More recently, the resisting power of steel armor-plate has been increased 25 per cent. by the process invented by Harvey, an American. This consists in face-hardening the plates, by causing the outer layers of the metal to take up a greater percentage of carbon. The Krupp firm of Essen, Germany, discovered a new process, which is kept secret, for hardening both steel and nickel-steel plates, by which a product of unexcelled quality is turned out. Its resistance is twenty per cent greater than that of harveyized steel. One foot of the best armor made to-day has more endurance than two feet of the best armor in 1880. It is said that the principal armor-plate makers of America, England, and France are now using this process, under agreement with Krupp. The steel is subjected, while hot, to hydraulic forging. This renders the whole mass more homogeneous than old methods, making it stronger and freer from flaws. It is next sawed or planed into plates of the required size, and then harveyized by cementation, hardening and tempering. Krupp's process carries the hardening deeper into the plate, because chrome, probably, as well as nickel is used in the steel. Hardening the steel increases the brittleness and the liability of the plate to crack, but its back remains extremely tough, and so the risk of cracking is lessened. Krupp plates resist ordinary projectiles better than Harvey armor does, but Harvey plates resist capped projectiles better and are not liable to crack. Krupp armor 12 inches thick withstands and smashes 12-inch shells, though dented four or six inches, but is cracked by 1,800-lb. torpedo shells. On May 27, 1908, the 11-inch armor plate of the Florida, a United States monitor, successfully resisted 12-inch shells containing a new high explosive. The first plates used were less than five inches thick. By 1876 solid steel plates of 22-inch thickness had been produced. Fully 4,000 tons of armor-plate are used on the exposed sides and turrets of some modern battleships.

Armour, Hon. John Douglas, a distinguished Canadian jurist, was born in the county of Peterborough, Ontario, in 1830, the son of the Reverend Samuel Armour. He was educated at Upper Canada College and Toronto University. He studied law with Chancellor Vankoughnet and was called to the bar in 1853. He progressed rapidly at the bar. In 1877 he was appointed judge in the Court of Queen's Bench. In 1887 he became president of the court. He was one of the most capable of Canadian judges, and served as one of His Majesty's Commissioners in the Alaska Boundary case. Judge Armour declined the honor of knighthood. He died in England in 1903 while on a public mission.

Armour, Philip Danforth, an American meat packer and capitalist, head for many years of the great firm of Armour & Co., pork-packers and dealers in dressed meats and provisions, was born at Stockbridge, New York on May 16, 1832. The house with which he was long identified, and through the successful operations of which Mr. Armour amassed a large fortune, was founded in 1862 by Herman O. Armour. Philip D. Armour joined the Chicago concern in 1875. The volume of its business, which gave employment to more than 11,000 persons, exceeded a hundred millions a year. Much of his large income Mr. Armour gave away in private and public charities. The chief object of his benevolence was the Armour Institute of Technology in Chicago, which was opened in 1893. In 1933 this institution had seventy-eight instructors and an enrollment of 908 students. Connected with this were the Armour Mission of Chicago and a group of apartment buildings, rented to workingmen and their families, known as the Armour flats. Mr. Armour's enterprises included, besides the great dressed-meat factory, a grain business of large volume and ownership in a great railway system. He died in Chicago on January 6, 1901. His wealth was estimated at his death at about forty millions.

Arms, weapons of defense. Just as the invention of powder made armor useless, so it changed the kinds of weapons used, which differentiates weapons into ancient and modern arms. Of ancient arms, the most common in the earliest wars were missiles to be used at long range. Thus, in the time of the Old Testament, the bow and the javelin were the favorite weapons of oriental races, while for close fighting merely straight daggers were used. Among the Greeks the chiefs used a long and heavy spear, which they threw as a missile, often ending their combats by a duel with short swords. The masses fought with a pike, in close column or in a phalanx, which afterward became so famous in the Macedonian phalanx with which Alexander the Great conquered the world. The pike was twenty-four feet long, held in the hand, and the men were so drawn up as to present a solid front of glittering spear-points. The Romans used a short massive javelin, six feet long, which they hurled at the enemy at a distance of ten or fifteen paces, and then closed on them with their short two-edged broadswords. They depended largely on the broadsword, and the lines were so drawn up that each man had room for full play with it in single combats, in which the training of the Romans almost always secured them the victory.

In the middle ages steel-clad cavalry were the main strength of the armies. Their arms were the lance, mace, battle-axe and the two-handed sword; but they relied mainly on the lance. This was a heavy weapon, eighteen feet in length, balanced by the weight of its butt end, which was often a foot in diameter at twenty inches from the extremity, and made to fit the arm of the champion as it was laid in rest. The infantry carried at this time the famous cloth-yard bow; the bills, like a heavy scythe blade, set erect on a four-foot shaft the leaden mallets and long knives of the Anglo-Normans; the pikes and halberds of the Swiss; the crossbows of the Genoese; and the Scottish spear.

Modern arms begin with the battle of Pavia in 1525, when the matchlock was first used so as to be of any real service, though it was awkward and had to be used from a rest. It was gradually improved, and at the beginning of the 17th century the bayonet was added, which made it much more complete, as it gave the musketeer a means of defense at close quarters. The rifle was brought into prominence in the American Revolution and in the Revolution in France. Since that time improvement has been rapid, and the invention of the simple modern percussion lock, of the minie-rifle bullet, of revolving-chamber pistols and of breechloading of every kind has greatly increased the destructive character of warfare.

The greatest attention and most experimenting are given to field artillery which is broadly divided into light artillery for quick firing and rapid movement, and heavy artillery for throwing projectiles. Anti-aircraft guns are also used extensively. Machine guns load, fire and extract by machinery; some operated by hand-power, others by the action of the powder-gases on a piston or through the recoil of the barrel. The invention of smokeless powder, the application of electricity and the use of powerful explosives in shells have in recent years doubled the efficiency of arms. The speed at which they can be discharged has also increased greatly, the U. S. warship Georgia, five years younger than the Oregon, being able to fire nearly three and a half times faster. Smoke and fouling have been done away with. The size of weapons and their recoil from firing have been lessened. Pressure on the ammunition chamber has been diminished. Soldiers as well as gunners can aim now without exposing themselves, for not only is the telescope used for sighting, by fastening it to the weapon, but the hyposcope, by an arrangement of mirrors enables a marksman to aim while entirely concealed from view.

To-day, the United States regular infantry and cavalry are armed with the short U. S. rifle, Springfield model 1903, which superseded the Krag-Jorgensen.

See ARTILLERY; CANNON; GUNNERY.

Armstrong, Samuel Chapman, an American educational philanthropist and soldier, was born in 1839 in the Hawaiian Islands, where his father was a missionary. In 1862 he entered the Union army and rose to the rank of brigadier-general. During the war he took a hearty interest in the Freedmen's Bureau. In 1868 he founded and became president of the Hampton Normal and Agricultural Institute of Virginia for the education of Negroes and Indians. He died at Hampton, Virginia, on May 11, 1893.

Army, a body of armed men, so organized and disciplined as to become a vast, movable military engine.

Ancient Armies. Sesostris of Egypt, about sixteen centuries before Christ, is the first conqueror who is said to have maintained a regular army. He divided his kingdom into thirty-six military provinces, and established a militia with which he overran Asia as far as India. Some centuries later the great Persian kings formed a vast standing army, apportioned as garrisons among the provinces, under control of military governors. In time of war this army was increased by a general levy from the barbarian peoples that had been conquered. The Greeks, who alone could resist these vast barbarian hosts, kept no standing army, but maintained militia in each small state which united in times of foreign war. They did much, however, for military science; the Spartans invented the phalanx; the Athenians added their light-armed troops and cavalry to cover the front and to harass the enemy in the rear. Miltiades is said to have first used the "double step," to increase the momentum of attack, while the Thebans first made use of the long and narrow column to pierce the lines of the enemy. The rise of the great Macedonian power marks the next standing army, which under Philip and Alexander conquered the world. Rome introduced changes in army matters that have influenced the whole civilized world. About 200 B. C. every Roman from the age of seventeen to forty-six was liable to be called upon to serve as a soldier. The levies passed through a severe course of discipline. Every year the magistrates sent up the names of the men liable to service, from which their legions were chosen, and the Roman legion in its best days excelled all other troops in discipline and valor.

Armies of the Middle Ages. When the feudal system arose, national armies gave place to the small armies gathered around each chief, whose little conflicts make up the greater part of the wars of the middle ages. The crusades first united these troops into an army against a common foe, and showed the need of organization and discipline; and from this time foot-soldiers began to take the place of the mounted cavalry which had carried on the warfare of the previous few centuries.

Modern Armies. With the use of firearms began the gradual change in army methods which has resulted in the modern military system. During the Thirty Years' war (1618-48) Gustavus Adolphus experimented with methods of dealing with infantry; the long wars of the reign of Louis XIV brought in the grouping of armies into brigades and divisions; while Frederick the Great in the next century carried tactics and drill to such a point of perfection that nearly all his victories were won by manœuvering. Horse artillery was first used during this period. The French Revolution so exhausted the resources of France that she was compelled to pass a law in 1798, making military service compulsory. Every citizen was made liable to four years' service, and all between the ages of twenty and twenty-five were enrolled. This irresistible power gave Napoleon such an advantage that the other European powers, except England, followed her example; and Prussia added the reserve system. Now, in most nations, will be found a standing army, with its several corps and body of cavalry, and an army of reserves, of two classes, those awaiting immediate call to arms and the militia or second line of reserves. Among European nations, all except Great Britain, have compulsory service. Under compulsory service the pay of the soldier is small so that at a given expense more men are kept under arms than under the volunteer system and the state has, in time of war, its entire mass of able-bodied men to draw upon.

United States Army. The United States has been notable for its small standing-army in time of peace as compared with European nations. Before the Civil War the army numbered but 12,000 men. During the Civil War, in various levies, a total of 2,859,132 men were mustered in for various periods of service. This immense army was quickly disbanded at the close of the war, and in 1874 a law was passed which fixed the maximum strength of the army at 25,000 enlisted men. The exigency of the Spanish-American war, however, was provided for by an increase of the regular army and the organization of a volunteer army.

On June 3, 1916, a federal law was passed providing for the gradual increase of the national guard from an immediate strength of 200 men for each senator and representative in congress to a strength of 800 for each senator and representative, making a total of 400,000.

On August 5, 1917, the whole National Guard, 450,000 men, was drafted into the federal service and ordered to sixteen cantonments. On June 5, 1917, 9,659,382 young men between the ages of twenty-one and thirty, inclusive, registered for national service under the Act of May 18, 1917, which followed the declaration of a state of war with Germany on April 6. This measure was known as the "Selective Conscription Bill." From this registration enough men were selected to make up, with the forces of the regular army and the National Guard, the number of men required for an immense force. On August 31, 1918, the age limit was broadened to include men from eighteen to forty-five.

General Staff. By act of Congress, approved February 14, 1903, the position of commanding general of the army was abolished and a general staff was established, to be composed of one chief, two general officers to be detailed by the president, four colonels, six lieutenant colonels, twelve majors and twenty captains. The membership is now, by act of Congress, unlimited as to number. The duties of the staff are to prepare plans for the national defense and for the mobilization of the military forces in time of war; to consider all questions relating to the efficiency of the army and its state of preparation for military service; to render professional aid to the secretary of war and superior commanders and to act as their agents in informing and co-ordinating the action of all the different officers to the supervision of the chief of staff; and to perform such other duties as may be prescribed by the president.

The base pay of enlisted men ranges from $21 to $157.50 a month, according to circumstances, while the base pay of warrant officers varies from $109 to $185 a month, according to grade and service. The base pay of commissioned officers ranking below the grade of Brigadier General ranges from $1,500 to $4,000. Officers and enlisted men serving abroad, except in Porto Rico and Hawaii and the Canal Zone get 20 per cent. additional.

The president (q. v.) is officially the commander-in-chief of both the army and navy and of the militia of the several states when they are called into actual service of the U. S. His position is much like that of the president of a manufacturing corporation who usually does not understand the technical processes of the business but whose services are of great value in maintaining a general supervision over policies and results. Congress may be compared to the board of directors of such a corporation for it has the power (Constitution Art. I, Sec. 8) to provide for the common defense, declare war, raise and support armies, provide for calling forth the militia, to execute the laws and for organizing, arming and disciplining the militia and governing it when employed in the services of the United States.

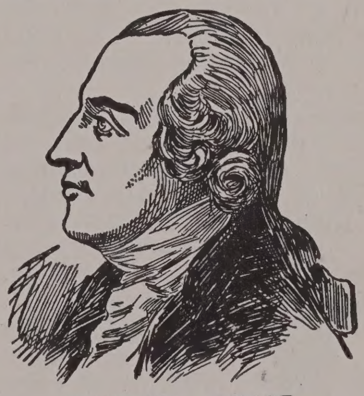
In monarchial countries the commander-in-chief of the army is the sovereign but, as in the United States, the control of army matters is more or less in the hands of the representatives of the people, depending upon the extent to which the monarchy approaches absolutism in those countries.

Army-Worm, the larva of a very common destructive moth. It appears every year in the United States east of the Rocky Mountains, but attracts attention only when it appears in great numbers. Then it marches, like an army, from one field to another, destroying the crops in its path. The worm is one and one-half inches long when full grown, and striped with black, yellow and green. Fields of grain are protected by surrounding them with ditches with vertical sides, into which the worms fall and cannot get out. Their numbers are largely kept down by fungous diseases and parasitic insects.

Arndt (*ärnt*), **Ernest Moritz,** a German poet and patriot, was born in 1769 on the island of Rügen. The son of a former serf, he yet received a good education with a view of entering the ministry; but after traveling over a great part of Europe he became professor of history at Greifswald. He assisted in the abolition of serfdom by his writings; and an attack on Napoleon in another work compelled Arndt to flee to Stockholm after the battle of Jena. Returning after a few years to Germany, he was active in stirring up the national feeling of his countrymen and in preparing them to throw off the foreign yoke. His songs, poems and other writings kept up the spirit of the Germans during the war of liberation. His famous song, *Was ist das Deutschen Vaterland* (What is the German Fatherland?), is sung wherever German is spoken. In January, 1818, he became professor of history in the then new University of Bonn, from which position he was suspended because of his energy in reforms, but restored in 1840. He was at one time a member of the national assembly. Vigorous in mind and body, beloved by the whole German nation as Father Arndt, he died at the age of 90 in January, 1860.

Arnim, Bettina von, famous for her acquaintance and correspondence with Goethe, was born at Frankfort, April 4, 1785. Her intimacy with Goethe lasted from 1807 to 1811. Shortly after his death she published a mass of correspondence said to have passed between them. There is no doubt that Bettina put a large amount of new matter into Goethe's letters, and some of them he never wrote at all. However, Bettina's freshness and power as a writer make them interesting and valuable. Her correspondence with the friend of her youth, Caroline von Günderode, and with her brother Clemens Brentano, probably equally fictitious, while not as famous as her correspondence with Goethe, is of high value. She died in 1859.

Ar'no, next to the Tiber the most important river of Central Italy, rises on Mount Falterona, at a height of 4,444 feet above the sea. It flows westward 140 miles and empties into the sea, eleven miles below Pisa. At Florence it is 400 feet wide, but can be forded in summer; at other times it can be navigated by barges thus far. It is noted for its rapid and destructive floods.

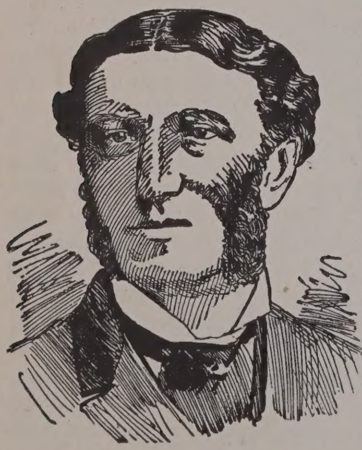


BENEDICT ARNOLD

Ar'nold, Benedict, a brilliant and dashing American general, but a traitor to his country. He was born in Norwich, Conn., January 14, 1741. Reckless and fond of adventure, he ran away from home when fifteen years old, and joined the American forces in the French and Indian War but soon deserted. On the breaking out of the Revolutionary War, he helped Ethan Allen and his Green Mountain Boys to capture Fort Ticonderoga; took a gallant part in the disastrous siege of Quebec, where he was wounded, and for his bravery was made a brigadier-general; and handled with skill a flotilla in the battle of Valcour Island. Arnold had a violent temper, and when, in 1777, five of his inferiors in rank were made major-generals, he was very angry, but kept on fighting in the colonial cause showing his usual skill and bravery in the battle of Ridgefield, where his conduct gained him the rank of major-general, and in the battle of Saratoga, where his horse was killed under him and he himself was severely wounded. Disabled by his wound, he spent much of the winter of 1777-78 in the hospital at Albany, and the next spring was placed in command of Philadelphia. Here he met Major André, with whom he formed an acquaintance which ended disastrously for both. In 1780, Arnold, at his own request, was given command of West Point on the Hudson, one of the most important points in the colonies, which he traitorously agreed to betray into the hands of the British. After his secret interview with André, and the capture of that officer, Arnold fled to the British army, in which he was given a command. In the latter part of the war he led an attack against his native state, and when peace was declared, went to London, where he lived in obscurity until his death on June 14, 1801.

Ar'nold, Sir Edwin, an English poet, scholar and journalist, was born June 10, 1832, the son of a Sussex magistrate. He studied at Rochester and at King's College, London; was elected to a scholarship at University College, Oxford, where he won the Newdigate prize by a poem on Belshazzar's Feast. He taught at Birmingham, and was principal of the government Sanskrit College, at Poona, India. In 1861 he became one of the editors of the Daily Telegraph, London; and, in connection with it, to him was largely due the sending of Mr. George Smith to Assyria for exploratory purposes and of Stanley to Lake Victoria and down the Congo. His writings, chiefly poems, include: *The Indian Song of Songs*, *Indian Poetry*, *Pearls of the Faith*, *The Song Celestial*, *The Light of Asia* and *The Light of the World*. He died March 24, 1904.

Arnold, Matthew, an eminent English poet, essayist and critic. He was born at Laleham, December 24, 1822, the eldest son of Dr. Arnold of Rugby. He studied at Winchester, Rugby and Balliol College, Oxford, and was made a fellow of Oriel. After acting for some years as a private secretary, he was made government inspector of schools. In 1857 he was elected professor of poetry at Oxford. In 1883 he lectured in the United States. Arnold's poetical works place him in the front rank of modern poets. As a critic his literary judgments have long been received by the literary world with a higher respect than is given to the criticisms of most other writers. His prose works include *Essays in Criticism*, *Culture and Anarchy*, *Literature and Dogma*, *Irish Essays* and *Last Essays on Church and Religion*. He died suddenly at Liverpool on April 15, 1888. See *Letters of M. Arnold* (1848-88), collected by G. W. E. Russell and the monograph by George Saintsbury.



MATTHEW ARNOLD

Arnold, Thomas, headmaster of Rugby, was born June 13, 1795, on the Isle of Wight. He studied at Corpus Christi College, Oxford, and in 1815 was elected a fellow of Oriel College. As a boy he was shy and retiring, as a youth somewhat bold and unsettled in his opinions, but in his studies he took a high rank. The next few years were spent in fitting pupils for the university, in beginning his *History of Rome* and in the quiet study and thought which gave him those positive ideas of Christian belief and life which were strongly expressed in his later years. From this life he was called to be headmaster at Rugby, a position which made him famous as a teacher of boys. He had the tact to make himself both loved and feared. He made it a practice to believe his scholars. "If you say so, that is enough; of course, I believe your word." And so there grew up a feeling among the boys that it was a shame to tell him a lie. Once when he had sent away several boys, he said: "It is not necessary that this should be a school of three hundred, or one hundred or fifty boys; but it is necessary that it should be a school of Christian gentlemen." In 1841 he was made professor of modern history at Oxford, and he was just entering with enthusiasm upon his new duties, when he died suddenly, June 12, 1842. He was buried in Rugby chapel. His great work, the *History of Rome*, was broken off at the end of the second Punic War by his death. The story of his life has been told by one of his old pupils, Dean Stanley, in his *Life and Correspondence of Arnold;* but he will be best known as the schoolmaster in *Tom Brown's School-Days*, by Thomas Hughes, another of his pupils.

A'roids, the common name of the great plant family *Araceæ*, which contains about 1,000 species. The great display of aroids is in the tropics, where they are remarkably diversified. In our own flora, Jack-in-the-pulpit, sweet flag and skunk cabbage may be taken as representatives. One of the best known forms is the cultivated calla-lily. The feature of the group is the huge enveloping bract or spathe, which incloses the fleshy spike of inconspicuous flowers.

Aroostook (*a-rōōs'tŏŏk*) **War,** a somewhat jocular name given the boundary dispute arising between the province of New Brunswick, Canada, and the state of Maine, reaching its crisis in 1839 and settled amicably in 1842. By the treaty acknowledging American independence in 1783, the boundary between the two countries was loosely defined to be the St. Croix River, eked out by a line from its source to the watershed between the streams flowing to the St. Lawrence and those to the Atlantic Ocean. The United States set up for boundary a stream far to the east of the river, only to have their contention disproved by the discovery of Champlain's little colony on the island at the true river's mouth. A branch to the east was then seized upon, but commissioners agreed upon the most westerly branch and there, in 1798, set a stone monument. The watershed then fell into dispute; the United States asserted that it skirted the St. Lawrence valley, a hundred miles north. The district became known as the disputed territory. In 1829 the king of the Netherlands, to whom the dispute was referred for arbitrament, refused a decision. Ten years later, lumber-thieves began cutting timber there in defiance of all law. The Maine authorities arrested them, and were in turn arrested by New Brunswick lumbermen. Maine sent 1,800 militia to the Aroostook River, and a call was issued for 10,000 more to take possession. Sir John Harvey, governor of New Brunswick, occupied the ground with two regiments of regulars, artillery and several bands of volunteers. Nova Scotia voted all her militia and £100,000 in aid. At this crisis Gen. Winfield Scott was sent on by President Van Buren. Harvey had fought against him at Lundy's Lane and Stony Creek, and their respect was mutual. The war fever abated, and the question was referred to a commission. In 1842 Alexander Baring, for Great Britain, and Daniel Webster, for the United States, met and framed the treaty known as the Ashburton, from the barony soon to be conferred upon Mr. Baring. Under it a line was continued due north from the monument of 1798 until it met the St. John River somewhat beyond the mouth of the Aroostook, giving New Brunswick only 5,000 and Maine 7,000 square miles of the land in dispute. When the treaty came up for confirmation in the United States senate, ratification was at first refused, the United States wanting all the territory. But when Webster produced a map which had been in his possession all the time, showing that Franklin himself in 1783 had agreed precisely upon the boundaries set up by New Brunswick, the treaty was confirmed. The survey in pursuance of the Ashburton treaty is not yet complete, but several supposedly American towns have been compelled to transfer their allegiance to New Brunswick as it has proceeded.

Ar'pad, the national hero of Hungary, under whom the Magyars first gained a footing in the country about the year 884. Chosen duke on his father's death, he carried on an incessant warfare with the Bulgarians, Wallachians and Moravians, and made several successful sallies into Italy. He died in 907, leaving his power to his son. The Arpad dynasty ruled Hungary as dukes until 1000, and as kings from that year until 1301. Arpad still lives in the popular songs of his country, and not a little legend has gathered around his name.

Arrhenius (*ăr-rē'nĭ-us*), **Svante,** a distinguished Swedish chemist, born February 19, 1859. At the age of 19 he received the degree of Doctor of Philosophy at the University of Upsala. Since 1895 he has been professor of physics in Stockholm. His most important contributions to knowledge are in the domain of physical chemistry, more particularly in the theory of solutions. The explanation which he has recently offered for the repulsion which the tails of comets experience on approaching the sun is probably the simplest and most satisfactory ever given.

Ar'rowroot. A well-known starch obtained from the thick underground stems of various tropical plants related to *Canna*. Arrowroot is adulterated with the starches of potatoes and corn.

Ar'senal, a government establishment for the manufacture, storing and issue of arms, gunpowder and other munitions of war for land and marine forces. In the United States those naval arsenals which provide for the construction and repair of war vessels, are called navy yards. In the Old World, where the term is more familiar and is equivalent to our navy yard, the most notable is the Royal English arsenal at Woolwich, a borough of the metropolis, with its great gun-factories, military carriage and transport departments, laboratories and establishments for the manufacture of ordnance and war stores, and the seat also of the Royal Military Academy for the education of cadets for the artillery and engineer service. Besides Woolwich, there are also in England notable naval dock-yards at Portsmouth, Chatham, Sheerness, Millwall and the West India docks at London, together with naval stations abroad at Gibraltar, Malta, Ascension, Bermuda, Cape of Good Hope, Sydney, Bombay and Weihaiwei. Other Old World arsenals embrace those of France at Cherbourg, Brest, Toulon, and Le Orient; those of Germany at Wilhelmshaven, Kiel and Dantzic; those of Russia at Kronstadt, Reval and Sevastopol, besides Antwerp in Belgium, Cartagena in Spain and Venice and Spezia in Italy. In the United States the home navy yards, are at Brooklyn, N. Y., Charlestown, Mass., Kittery, N. H., Washington, D. C., League Island, Pa., Portsmouth, Va., Mare Island, Cal. and Puget Sound, Wash. Besides these, there are naval stations at Charleston and Port Royal, S. C., Key West, Fla., Algiers, La., Pensacola, Fla. and at North Chicago, Ill., for the Great Lakes service; together with torpedo and training stations at Newport, R. I., and a training station at Yerba Buena Island, Cal. In foreign parts the United States have naval stations at Tutuila, Samoa; at the Island of Guam; San Juan, Porto Rico; Culebra, W. I.; Guantanamo, Cuba; Honolulu, Hawaii; and Cavite, Philippine Islands. At home, Springfield, Mass., has from the Revolutionary era been the seat of the small-arms manufacture; Harper's Ferry at an early era also became important as an arsenal, with others, later on selected, at Watertown, Mass., Watervliet, N. Y. and Rock Island, Ill., besides a powder depot at Dover, N. J. and a proving ground at Sandy Hook, N. J. During the Civil War, there were arsenals at Springfield, Boston, Washington and elsewhere, but then, as now, for powder, small-arms and war supplies, the United States chiefly depended and depends on private factories, and on the larger manufacturing firms; also for the heavy guns used by the army and navy.

Ar′senic. See Poisons.

Art. When we think of "all creation," we think of the sky and the earth and all things in and of and around the sky and earth, including, finally, people and the things *they* have created. To this whole concept we sometimes apply the name of Nature. When we wish to distinguish from the rest of nature the things that human beings have accomplished, we sometimes use the word Art This word is used in other senses, too, but in its largest sense it includes all those things that have been added by man to nature as he found her. In this light art might be said to begin where nature leaves off—to be, in other words, "all but nature." As a matter of fact, however, we know that nature never does and never will "leave off" so long as man "keeps on," and that art is simply our name for Nature, when she works through man's intention.

The stem A R from which the word art is descended is probably the same stem from which we get such words as *articulate*, "to fashion," "to join," and *arithmetic*, fundamentally, "a putting together," as well as *artificial* and *artisan*. The word Art signifies *a doing*, *a making*, *a fashioning* or *a putting together*, and it usually implies that the thing is accomplished by human skill.

Dr. Johnson's definition for art is "The power of doing something which is not taught by nature or by instinct;" for example we say, "the art of making violins." But the word has other applications; we have already seen that it signifies not only *the power of doing*, but also *the doing itself;* as, when we speak of "devoting one's life to art," we mean, usually, the production of works of art. Besides this the word may mean *the principles which govern the doing;* as in the phrase, "a training in art." Lastly, the word is used with reference to *the thing done*—and we speak of "French art" when we mean the productions of the artists of France.

The various arts are, in our day broadly divided into two classes, ordinarily distinguished as the useful arts and the fine arts. The meaning of the former of these terms is self-evident and it, in turn covers such subdivisions as the liberal arts, industrial arts, manual arts, household arts and others. The second term, the fine arts (see Fine Arts), designates those activities which have their root in man's impulsive nature, with beauty in some form as their result.

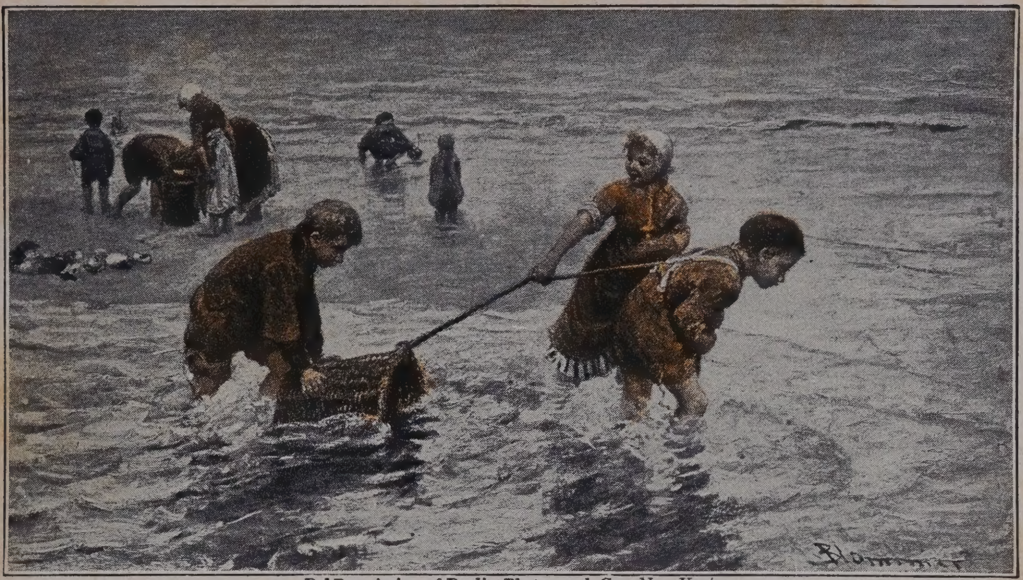
The word art is nowadays often applied to fine arts alone; thus we sometimes speak of "art-lovers," meaning persons who are interested in the fine arts; and sometimes the significance of the term is narrower still so that it refers simply to sculpture and painting or even to painting only.

When any other activity than the fine arts is specifically referred to as "an art," the idea of excellence is usually implied—either in the end to be attained or in the mode of attaining the end; as, "the art of flying;" "the conjuror's art;" "the art of boiling an egg"

At all times some art or arts have been held in higher esteem than others, this often being due to the fact that some arts demand a more complex use of the faculties than others and sometimes to the circumstances under which the various arts were practiced. Under the feudal system for instance, warfare was regarded as one of the highest and most important of arts. In communities like ancient Rome, where the land was tilled by free cultivators, agriculture was considered one of the highest arts. In Pompeii, where the art of painting was practiced by the slaves exclusively, this came to be regarded as one of the meaner arts. In medieval Italy, where commerce and manufacturing became highly organized, they were ranked among the "greater arts," and the word art (*arte*) was used to designate the guilds or companies by which these activities were carried on.

There is standing in Florence to this day a beautiful building, erected by the

Land, Sky and Sea in Art



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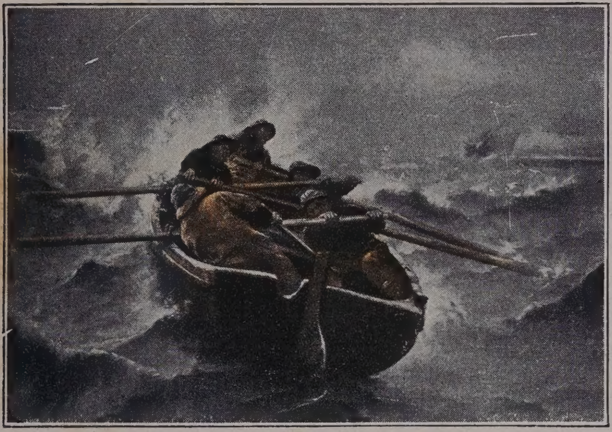
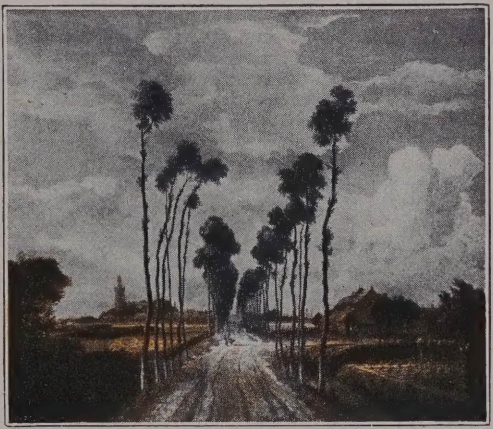
The Crabfishers, by Bernardus Blommers
(Dutch b. 1845)

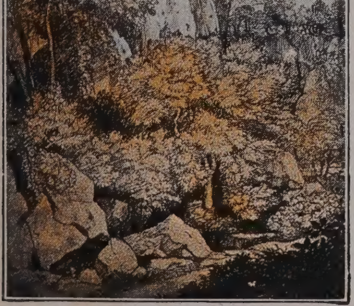


The Life Savers, by Georges Haquette
(French b. 1850)

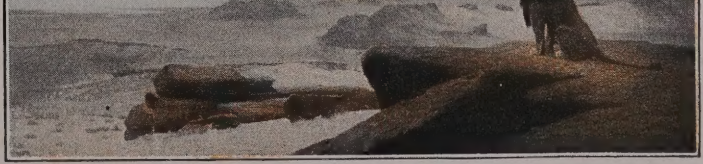


Avenue of Trees, by Hobbema
(Dutch b. 1638)

COMPARE the great variety in this page group—the quiet waters in which the Crabfishers are working, the stormy sea, the quiet Dutch landscape, the desert scene and the bold cliff by Claude.



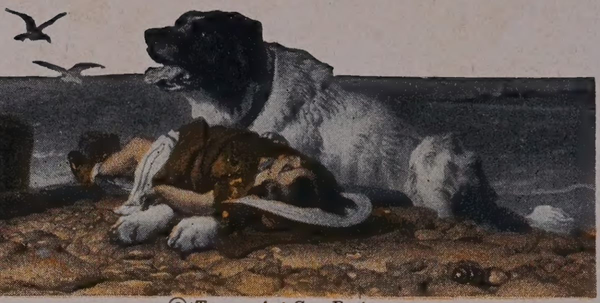
Landscape Study, by Claude
(French b. 1600)



The Two Majesties, by J. L. Gerome
(French b. 1600)

Natural History in Art

Work of the Animal Painters



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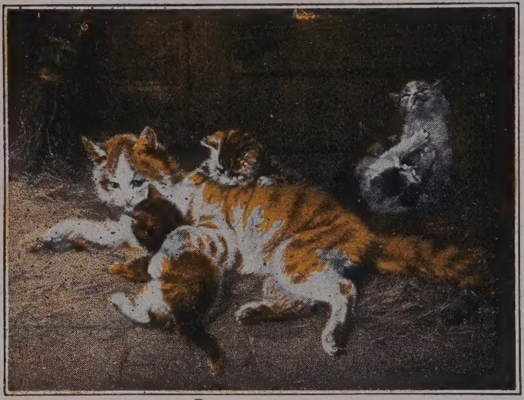
Saved, by Sir Edwin Landseer (English b. 1802)



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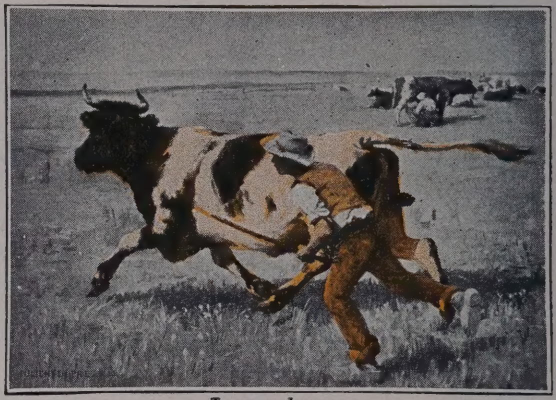
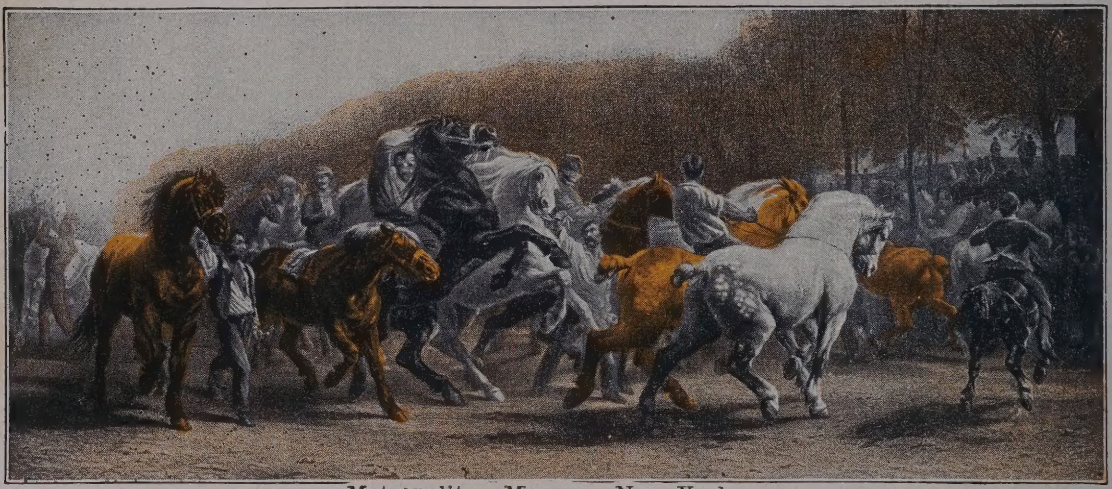
Cat and Kittens at Play, by Julius Adam (German b. 1852)



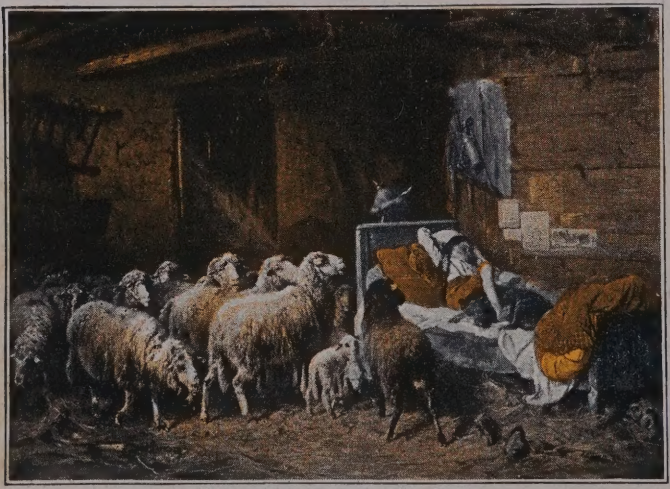
Luxembourg

The Escaped Cow, by Julien Dupre (French b. 1851)



Metropolitan Museum, New York

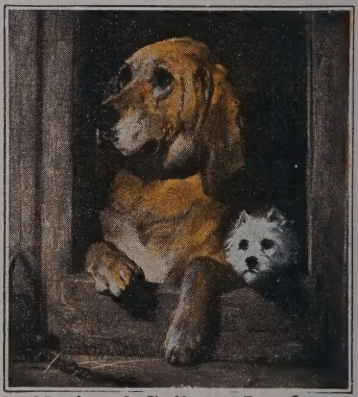
The Horse Fair, by Rosa Bonheur (French b. 1822)



Photograph by Soule Art Co., Boston

National Gallery, Berlin

One of the Seven, by Otto Gebler (German b. 1838)



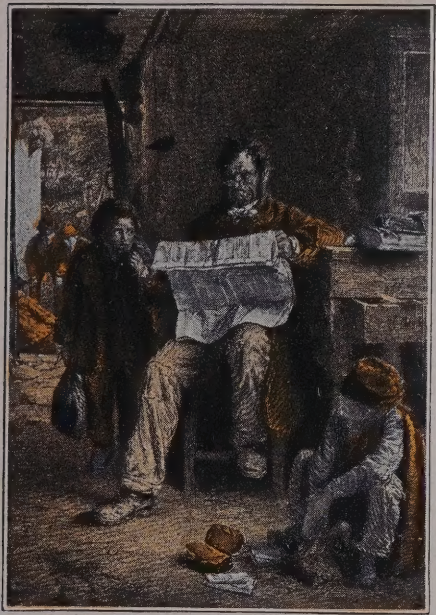
National Gallery, London

Dignity and Impudence, by Landseer

A big dog always seems to be "on his dignity" in the presence of a little dog!

Notice the swallow perched on the boy's hat, the morning sunshine streaming through the opening which you cannot see and the cracks in the door which you *can* see. How troubled and restless the sheep look! They are anxious to get out to their breakfast. (See SEVEN SLEEPERS.)

Painters of Common Life



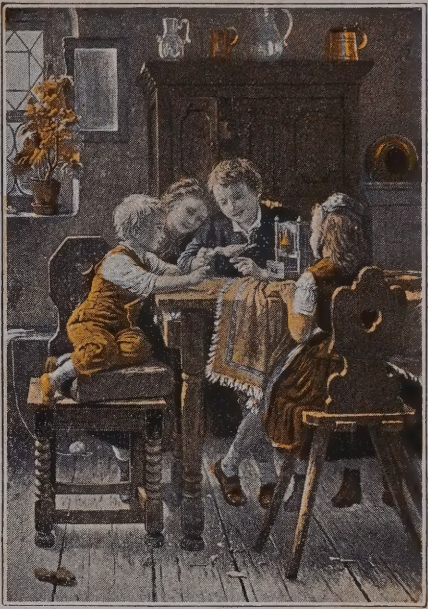
From a Steel Engraving

Kept In, by Erskine Nicol
(Scotch b. 1825)

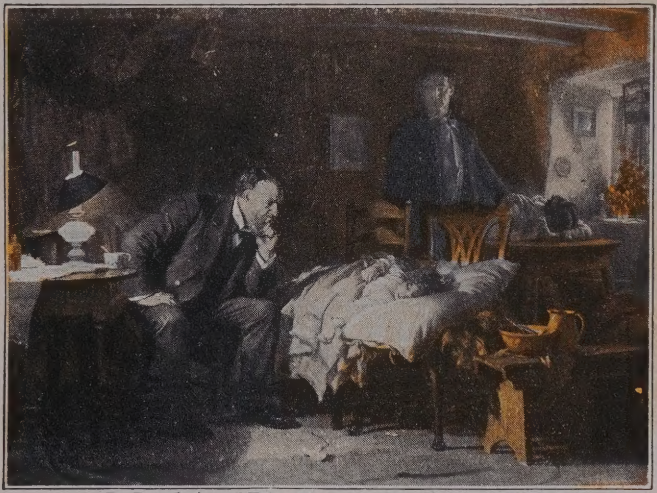
Pictures That Tell Stories

With what delight and with what profit children in school make stories about such pictures as those on this page every teacher knows and every parent *should* know. In "Kept In," for example, the good-hearted old school master isn't half so fierce as he is *trying* to be—with his pursed-up lips. The boy knows it. The battle is already more than half won and he has a piece of string ready for his confiscated top on the desk, when he gets it back. Notice that he has his hat and his books in his hand all ready to go.

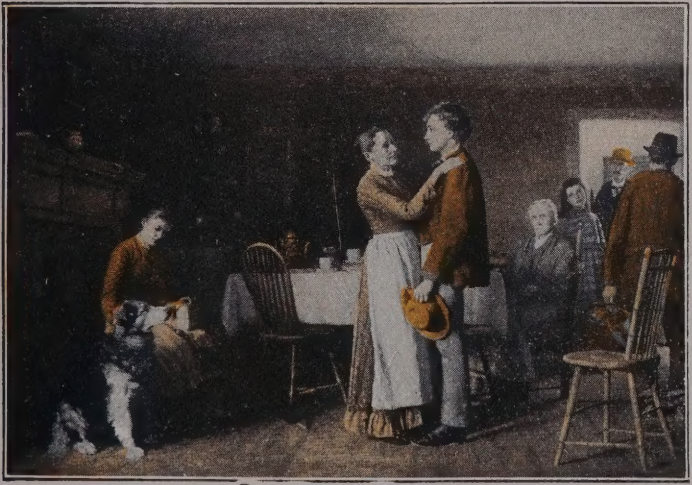
"Breaking of Home Ties" is widely used in school work because of its emphasis on the sweetness of home life. No other picture attracted so much attention at the Chicago World's Fair where it was first exhibited.



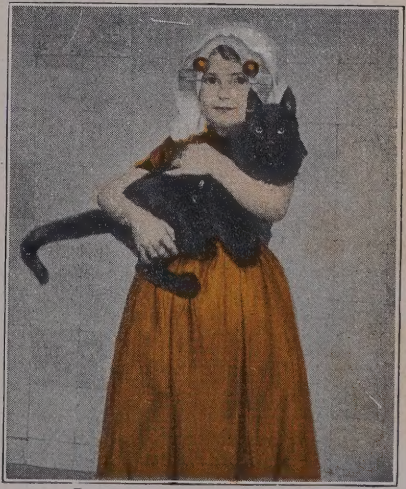
The Pet Bird, by Meyer Von Bremen
(German b. 1813)



By Permission of Taber-Prang Art Co., Springfield, Mass
The Doctor, by Luke Fildes (English b. 1844)

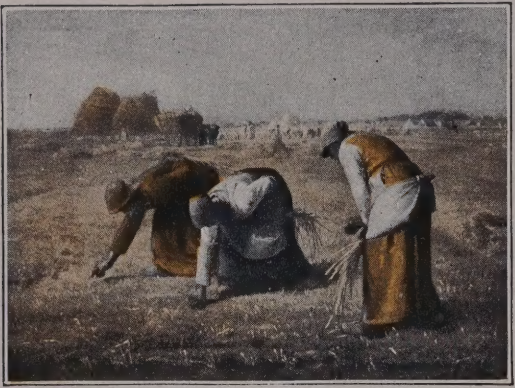


© *C. Klackner, New York*
Breaking Home Ties, by Thomas Hovenden
(American b. 1840)



© *Photogravure Turner Art Co.*
Girl With Cat, by Paul Hoecker
(German b. 1854)

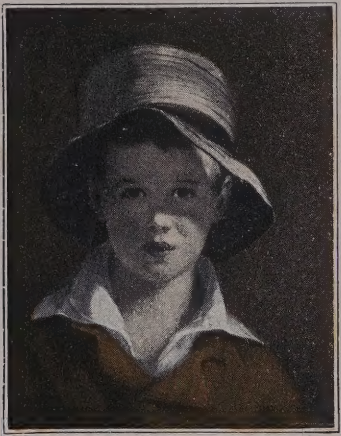
Painters of Common Life



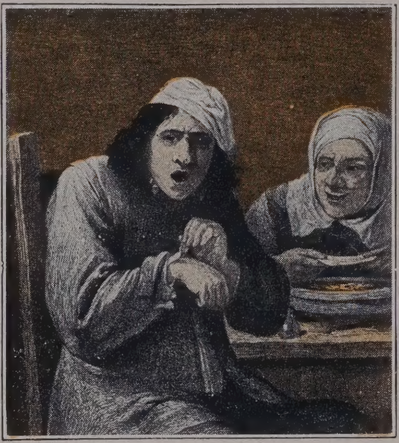
Louvre
The Gleaners, by Jean Francois Millet
(French b. 1814)

The Artist's Descriptions of Scenes and Character

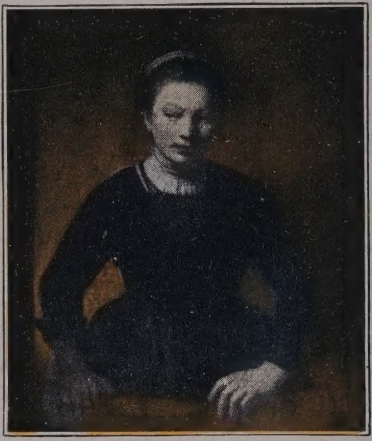
PAINTINGS which deal with common life, or are notable for their emphasis on detail, belong to the "genre" type. Genre corresponds to realism in literature. We here reproduce what by many is regarded as Millet's masterpiece and four other examples of genre. The original of "The Torn Hat," by Sully, is in the Boston Museum. Contrast this typical boy, by an American artist, with the "Dutch Girl," by Rembrandt, and both with the timid little French girls in the picture below.



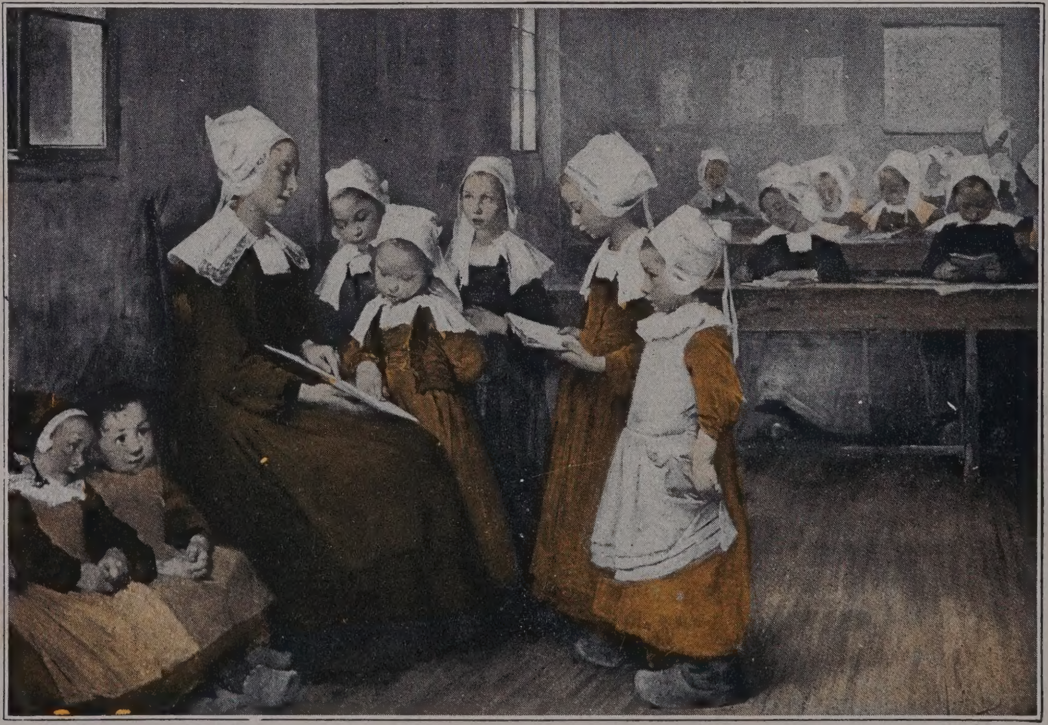
Thistle Print © *Detroit Pub. Co.*
The Torn Hat, by Thomas Sully
(American b. 1873)



The Sense of Touch, by Teniers
(Dutch b. 1610)



Chicago Art Institute
Portrait of a Girl, by Rembrandt
(Dutch b. 1606)



From His Series on French School Life.
Primary School for Girls in Brittany, by Jean Geoffroy (French b. 1853)

Arte of the Wool Merchants; connected with it is a corn-warehouse decorated with statues of the saints, contributed by the *arte* or guilds of the city, and executed by the best artists of the time.

We have spoken of the term art as covering all human activity. We have thus far avoided any special reference to that form of human activity which consists in the contemplation and analysis of nature—the subject which we call science. Nevertheless, since science strictly speaking, does not aim to produce things, but only to ascertain truths, it is clearly to be seen that it can be included only in the broadest interpretation of the term we are defining. If we can show what part of the field of human activity belongs to science, we may, by establishing its boundaries, find out just what is the field of art.

With what material does science deal? Our premise was that science deals with existing fact; all facts in nature fall within the scope of science. What is it that science does with these facts? Science observes, records, and in so far as possible explains these facts, shows their relations, one to another, and makes deductions from them. Now, with what does art deal? Art, since it adds to those things which nature has provided, deals with the production or attainment of ends, first assuming the desirability of such ends. Architecture, the art of building, for instance, assumes the need of houses and sets about producing them. Architecture calls in science with its knowledge of the stone, wood and clay which nature has provided and its knowledge of the effects of the elements upon such stone, wood and clay. Having obtained this knowledge from science, architecture acts upon it. To sum up the functions of art and science: "Science is the knowing, art is the doing. Art evolves, science involves."

It is thus seen that art cannot go on without science. Neither can science advance its investigations without the aid of art—that is to say, human activity—in carrying on its experiments and building its hypotheses. Science has been described as in the indicative mood, expressing itself by means of the declarative sentence: "Two and two are four." Art, then, is in the imperative: "Produce four." While science deals with the fundamentals by which ends are to be attained, art deals with the ends themselves, and with the attaining of them.

George William Eggers.

Artemis. See Diana.

Ar′tery, the name of the tubular vessels that convey blood from the heart. There are two sets of arteries: (1) The great aorta, springing from the left ventricle of the heart and reaching by numerous subdivisions and branches all the tissues of the body. (2) The pulmonary artery, springing from the right ventricle of the heart and branching through the lungs. The former is the systemic, the latter the pulmonary system. The pulmonary artery, of course, carries venous blood. The arteries are elastic, and, when filled with blood, are stretched and exert a steady pressure on that fluid. This causes them to force most of the blood on into the veins after death, and led the ancient anatomists to believe that the arteries were air tubes and the veins only blood vessels. The arteries and veins are connected by capillaries. The aorta was named by Aristotle.

Artesian (*är-tē′zhan*) **Wells** are borings straight down into the ground through which water rises above the surface of the ground. The possibility of getting water in this way depends upon the rock formation at a place. There is more or less water in all rocks. Rocks which are sandy and easily broken up part with a greater or less portion of the water they receive. For example, a cubic yard of pure sea-sand can hold about one third its bulk of water. It would part with nearly the whole of this into a well sunk in it and regularly pumped from. Chalk, which is composed of fine particles closely pressed together, holds as large a proportion of water; but from the power of what is called capillary attraction—the same power that lifts the sap in trees—little water would drain into a well sunk in such a rock. Where porous layers of rock are found resting on a layer which is impervious to water and covered by another layer also impervious, the water in the middle layer is held imprisoned. Where these three layers run across a valley and up a hill on each side, they will be exposed to the air at the top. The falling rain is carried down the middle layer, and gathers at the bottom of the valley, and in time the whole porous layer becomes water logged, and the water at the center is under strong pressure. Now, if a bore is made at the bottom of the valley into the water logged layer, the pressure will force the water above the surface. The most famous artesian well is that at Grenelle near Paris, which was bored in 1833–1841, and whose water is brought from a depth of 1,798 feet. It yields 516½ gallons of water a minute, which is forced thirty-two feet above the surface. The Chinese and Egyptians knew about artesian wells, and they have been bored in the Sahara desert. There are many artesian wells in the United States, where they are utilized for supplying cities, towns, villages and farms with water.

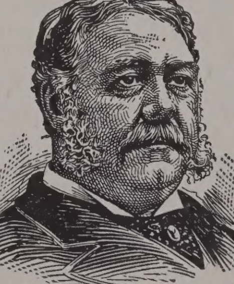
Artevelde (*ar′ta-velt*). **Jacob Van,** a Flemish leader of the people in the 14th century, was a brewer in Ghent. His wealth, eloquence and talents made him the most prominent man on the side of the citizens in their struggles against Count Louis of Flanders. The people of Ghent made him commander of their forces, and he banished from the town all the nobles and friends of the count His power was secure for ten years, but in 1335 he made a treaty with Edward III of England, persuading him to assume the title of king of France. To strengthen this alliance, he tried to make Edward the Black Prince count of Flanders, when the people rose in rebellion and Artevelde was slain July, 24, 1345.

Artevelde, Philip Van, son of the above; born in 1340. In 1381 the people of Ghent, who had driven away the Count of Flanders and plundered his house, were closely blockaded by the count. At this juncture, Philip, as the son of the great Artevelde, was asked to become their leader. The count's army was badly defeated and Bruges, which had sided with the count, was plundered and submitted to Artevelde. His power only lasted a year; a French army invading Flanders routed the forces of Ghent, and many thousands were killed, including Artevelde. His death occurred in Belgium, November 27, 1382.

Arthrop'oda. The largest sub-kingdom of animals, containing an immense number of species. They are known by having an articulated body and jointed legs. The group embraces four great divisions or classes: 1 *Crustacea*, including the lobsters, crabs, crayfish, shrimps and others. They usually live in the water and breathe by gills. The common pill-bug is an exception. 2 *Arachnida*, the spiders, daddy-long-legs, scorpions, mites and others. In this class the head and thorax are united. They have four walking legs and no antennæ. The representatives are air-breathers. 3. *Myriapoda*, the centipedes and thousand-legged worms. They are air-breathers, with the head bearing antennæ and distinct from the thorax. The latter forms with the other joint of the body a continuous line of segments from six to two hundred in number. Each of these segments bears a pair of legs. 4. *Insecta*, the largest class, including all insects. These breathe by air tubes distributed through the body. They show great variety of form and structure. The king crabs, the fossil trilobites and the interesting peripatus (see INSECTA) are sometimes separated from the other *Arthropoda* into distinct classes.

Ar'thur, a prince of the Britons, who is supposed to have lived about the 6th century. He is pictured in legend as the champion of the British tribes against the Saxon invaders and as the ideal of a knightly hero. The son of King Uther, he became leader of the Britons after his father's death. He married Guenevere, the fairest princess in the land, and with her lived in splendid state at Caerleon in Wales, surrounded by hundreds of knights and beautiful ladies, patterns of valor, breeding and grace to all the world. Twelve knights, the bravest of the throng, formed the center of the retinue, and sat with the king at a round table, known as the famous Knights of the Round Table. From Arthur's court knights went forth to all countries in search of adventure, to protect women, chastise oppressors, liberate the enchanted and to enchain giants and malevolent dwarfs. Among the most renowned of these heroes of legend were Percival, Tristram, Gallahad, Lancelot and the enchanter, Merlin. Arthur was killed in battle by his nephew, Modred, who had revolted against him. His body was carried by fairies to the Isle of Avalon to be cured, whence he was expected to return some day again to lead the Britons against the Saxons. Many critics doubt the existence of Arthur, and, of course, the stories that have gathered about his name are, many of them, only beautiful legends. His fancied adventures have been sung in many languages, but for English readers they are told most beautifully in Tennyson's *Idylls of the King*. At Innsbruck, in the Franciscan church, is a magnificent ideal, life-sized, bronze figure of Arthur.

Arthur, Chester Alan, the twenty-first president of the United States, was born at Fairfield, Vermont, October 5, 1830. His father was the Rev. W. Arthur, D. D., a Baptist minister and a native of the north of Ireland. He was graduated at Union College, New York, and was admitted to the bar in 1853. At the outbreak of the Civil War he held the post of inspector-general, and during the war was quartermaster-general for the New York forces. When he returned to the law, he was head of an eminent law firm. He took a prominent share in politics on the Republican side. In 1871 President Grant appointed him collector of customs at the port of New York. He was elected vice-president of the United States when Garfield was made president. The death of Garfield called Arthur to the chief magistracy, and he was installed as president on September 22, 1881, and held the office till March, 1885, when he was succeeded by Grover Cleveland. During Arthur's term of office two important measures were passed by congress: a bill dealing with the Mormon question and one for the exclusion of the Chinese. His administration was



CHESTER A. ARTHUR

recognized as clean and conservative, and he retired from office with the approbation of his party and the respect of the nation at large. He died November 18, 1886.

Arthur's Seat. See EDINBURGH.

Ar'ticles of Confed'era'tion. In 1776 the Continental Congress appointed a committee to draw up "Articles of Confederation and Perpetual Union." This committee prepared the articles of confederation and submitted them to Congress in 1776. It is not definitely known who wrote them. In the fall of 1777 the articles were sent to the legislatures of all the states for consideration. Within a year and a half all the states, excepting Maryland, had ratified them. Maryland refused to do so until all the states claiming any of the northwestern lands should give up their claims to the Confederation. These claims were finally granted, and Maryland ratified the articles in 1781.

As the provisions of the articles went into effect, their weakness became very apparent. Congress was the governing body, and in it each state had one vote. On all important questions the approval of nine states was necessary to pass an act; thus a few states could easily defeat any measure. The main difficulty with this whole plan of government was that Congress could only recommend to the various states that they collect certain sums of money, or raise an army of a certain size, or perform other acts for the good of the country; but had no means of enforcing its recommendations. There was no well-defined executive department, and no courts were provided. A committee which was appointed by Congress and which contained one member from each state acted during the recess of Congress and performed such duties as Congress directed. The difficulties which at once arose from so loose and incomplete a plan of government soon became so serious that a change was necessary, and so our present federal constitution was prepared and adopted.

Artil'lery, originally any projectile weapon or engine of war, even bows, arrows and slings; now it signifies either cannon of any kind or the soldiers who manage them. When field-guns began to be used, it was necessary to have a special body of men to study and become familiar with the flight and range of balls, the weight and strength of cannon and the manœuvering of heavy masses of field artillery. This was the origin of the artillery corps. After the great wars of the nineteenth century artillery had become the third great branch of military service, ranking with the infantry and cavalry. When cannon first came into use, the gunners were looked upon as mechanics and had a guild of their own. When a war broke out the different monarchs hired as many of them as they wanted, their pay being four times that of an ordinary soldier. Louis XIV in 1671 created the first special artillery force, and in 1690 founded the first artillery school. Other nations followed his example, and thereafter artillery developed steadily.

Artillery's duty is to help the infantry by smashing the enemy's artillery, machine guns and entrenchments, and preventing his infantry from fighting. These duties require artillery of several kinds. Comparatively small cannon, able to go anywhere and attack the enemy's infantry and front lines, make up the *light field artillery*. The six-inch and larger guns and howitzers which bombard the enemy's artillery, strong fortifications, and the areas in his rear, make up the *heavy artillery*. A modern army also has *anti-aircraft artillery*, and nations with seacoasts support *coast artillery* to guard seaports and landing places, as distinguished from the *mobile artillery* with the field armies.

In batteries which accompany infantry, cannoneers ride the carriages or walk. In *horse artillery*, accompanying cavalry, every man is mounted. *Mountain artillery* uses light guns carried on pack animals.

Since the cannon used in these branches are described in the article on cannon (*q.v.*), here we shall see how artillery is organized for fighting. The usual unit is the *battery*, with from four to six guns (four in the American army). Each gun, with its accompanying ammunition wagon or *caisson*, makes up a *gun section*, commanded by a sergeant. In horse-drawn light batteries, each section has two corporals, seven cannoneers, and seven drivers. A war-strength battery also has four *ammunition sections*, with two caissons apiece. These make up the *combat train* which hauls ammunition. The mechanics, cooks, signallers, etc., bring the enlisted strength to about 200, and over 150 horses are used. The officers are a captain and four lieutenants.

Three light batteries make up a battalion, under a major, and two such battalions make up a regiment, under a colonel. The regiment has over 200 men who haul supplies to the batteries, act as scouts, and provide the regiment's telephone and signal service. During the World War, two light regiments and one heavy howitzer regiment made up a *brigade*, one brigade accompanying each infantry division.

In war, the division commander gives his plans to the brigade commander, who assigns sectors and general missions to the regiments. Each colonel does the same for his battalions. The majors assign actual targets to the batteries, whose officers plan and conduct the actual firing.

The United States Artillery School is located at Fortress Monroe, Virginia. It aims at a course of training which shall not merely make expert artillerymen but men fitted for any office, however high in rank or command. The course is two years, and is properly a post-graduate course with reference to the United States Military Academy.

Ar'undel Marbles, part of a collection of ancient sculptures and antiquities gathered among the ruins of Greece early in the 17th century at the expense of the Earl of Arundel, and since 1667 in the possession of the University of Oxford. The most valuable of the marbles is the one bearing the Parian Chronicle, a compendium of the chief events in Grecian and Athenian history, covering a period of 1,318 years or from the reign of Cecrops (1582 B. C.) to the archonship of Diognetus (264 B. C.). The Arundel Society of London, instituted in 1848 for promoting the knowledge of art by the publication of facsimiles and photographs, was named after the Earl of Arundel.

Aryans (*ăr'yăns*), the name given to the parent race from which most of the modern Europeans are supposed to have descended. The race, possibly, lived originally in the highlands of Central Asia and spoke a common language. Now and then small groups separated from the parent fold and traveled to the northwest. The first of these groups were the Celts, who once seem to have spread over a large part of Europe, though the Welsh and Irish and a few other peoples are all that is left of them. A good while later the ancestors of the Italians, the Greeks and the Germans started westward and settled in the regions which these nations now occupy. Other tribes that set out in the same way are the Slavs, the Persians and the upper classes of Hindus. The languages of these different peoples are now quite different; but they show that they were once all part of the same root-tongue. The parent race was a peaceful, agricultural people, having a definite form of government. They probably lived in towns and built houses. All that we know about them comes from the study of the languages of European nations and of the Old-Persian and the high-caste races of Hindustan. The English are a branch of the Aryan race through the Germans.

Asa, son of Abijah and great-grandson of Solomon, was the third king of Judah and reigned from about 929 to 873 B. C. He was very zealous in opposing the worship of heathen gods, and is noted for the wisdom of his rule. A great army which the king of Ethiopia sent against him he completely overthrew. During most of his reign he was at war with Baasha, king of Israel, and at one time formed an alliance against him with the king of Damascus. His son Jehoshaphat succeeded him.

A'saph, one of the leaders of the choir appointed by King David for the religious service. His position probably became hereditary, his descendants thus forming a kind of religious order. He is supposed to have written several psalms.

Asbes'tos, an incombustible mineral of a flax-like, fibrous texture, composed of silica, magnesia and lime, and usually occurring in veins in highly metamorphic rocks. The sources of supply of commercial asbestos are deposits of two distinct minerals: one a variety of serpentine known as chrysotile; the other a variety of amphibole. The Canadian product, which is much prized, is of the chrysotile variety, and is chiefly found in the Thetford district, in the province of Quebec. There the more expensive grades have a value of from $150 to $250 a ton, though the mill fibre or paper stock commands but $30 or so a ton. The yield of the Canadian product in 1910, was 75,678 tons, valued at $2,458,929, the most of which was exported, only a small part being reserved for home consumption. The sources of the supply in this country are the states of Georgia and Wyoming, Idaho and Vermont. In the United States the yield in 1910 was but 3,693 short tons, valued at $68,357. The foreign sources, besides Canada, where asbestos is found, are Australia, Russia, Corsica and the Tyrol. The uses are now many to which asbestos is put, among them the manufacture of fireproof clothing, lining felt, theater curtains, etc., where protection is sought from fire; it is also in use for incasing steam pipes, pistons, hot-air joints and furnace pipes as well as for lampwicks, gas stoves and fireproof safes. It is valuable also for its heat-retaining properties. The ancients were familiar with asbestos, making use of it to envelope corpses on the funeral pyre, so as to retain the ashes.

As'bury, Francis, the first bishop of the Methodist Episcopal church ordained in America. He was born in Staffordshire, England, August 20, 1745. At the age of fourteen he was apprenticed to a mechanic, but two years later was led to begin work as a local preacher. Later he joined the itinerant ministry, and after three years of service was sent as a missionary to America, being appointed in the following year general assistant by John Wesley. Here he brought new life into the work, and at the outbreak of the Revolution, when many other ministers returned to England, he kept on in his labors. At the end of the war, it was decided to found an independent M. E. church for America, and he was ordained in 1784 as bishop by his colleagues who had already been ordained by Wesley in England. For more than thirty years he worked earnestly and successfully, and the wonderful progress of Methodism in America was largely due to his efforts and ability. In many respects he was much like his teacher and chief, John Wesley. He helped to lay the foundation of the first Methodist college in America in 1785. He died in Virginia in 1816.

As'calon or **Ashkelon,** one of the five chief cities of the ancient Philistines, lying north of Gaza on the Mediterranean. It had a shrine of the Syrian fish-goddess Derketo, and was the birthplace of Herod the Great. In Solomon's time it was subject to the Jews, but later became independent. Under the Romans it was a kind of republic and afterward the seat of a Christian bishop. The Arabs took it in 637, and in 1099 the crusaders, under Godfrey de Bouillon, gained a great victory before its walls. Recaptured by the Moslems, it was retaken after five months' siege in 1157 by Baldwin III. It was dismantled by Saladin in 1191, and completely destroyed in 1270 by Sultan Bibars.

Ascension (*ăs-sĕn' shŭn*) **Island.** Originally discovered by the Portuguese in 1501 and called Concepcion Island, its rediscovery on Ascension Day, seven years later, procured for it the name it still holds. It is of volcanic origin, 7½ miles long and with an area of 35 square miles, lying in latitude 7° 55′ south, longitude 14° 25′ west, 700 miles northwest of St. Helena. It came into possession of the British in 1815 and is under the jurisdiction of the admiralty, being used as a depot for coal, stores and provisions for ships on the South Atlantic station. It has been strongly fortified recently, and the discipline of a man-of-war is maintained. The population, including about 160 Kroomen, is 450. Georgetown, on the northwest coast, is the garrison station and there is an excellent sanitarium up Green Mountain. The island is a great resort of sea turtle, as well as of rabbits, wild goats and partridge.

Ascension, Right, in astronomy, a term used with declination (tending down or aside), for defining the position of points of the celestial concave and indicating their positions relative to each other, right ascension being measured on the equinoctial from the first point of Aries eastward, while declination measures the secondaries of the equinoctial to the north and south poles of the heavens from 0 to 90. Right ascension, which is commonly expressed in time, one hour corresponding to 15° on the celestial sphere, is invariably measured from west to east, thus corresponding to longitude on the earth, while declination corresponds to latitude. The right ascension of a star or other heavenly body is ascertained by a transit instrument and a clock.

Ascham (*ăs' kam*), **Roger,** a well-known scholar and teacher, was born in a small English village about 1515, and was taken into the family of a nobleman to be educated. While there he showed so much taste for study, that in 1530 he was sent to St. John's College, Cambridge. He was specially fond of Latin and Greek, and soon became known as a scholar in those languages. Soon after his graduation he began to act as a tutor, and his success brought to him the sons of many noblemen. He was then appointed Greek lecturer at the university, and in 1544 was made university orator. He was very fond of archery, and wrote a book about the right way to use the bow. He also was quite a musician as well as an artist. In 1548 he was appointed to take charge of the education of Princess, afterward Queen, Elizabeth. After traveling on the continent for a time, he became Latin secretary to Queen Mary, and when Elizabeth became queen he spent part of each day with her, reading Latin and Greek authors, of which she was very fond. His success as a teacher led him to write his famous book called *The Schoolmaster.* He died at London in 1568.

Ascomycetes (*ăs-kō-mī-sē' tēz*). A very large group of low plants (*Fungi*), among which the common mildews may be taken as a type. The mildews are surface parasites and are commonly found covering the leaves of the higher plants with a whitish covering. The leaves of the lilac are very commonly infested by this parasite. To this group also belong such well-known forms as the common blue mould found on bread, fruit, etc.; the common fungus, whose subterranean body produces truffles; the fungi which cause the diseases known as black knot of plum and cherry; forms which cause the witch's broom, peach curl, etc.; while to the same group belong the common cup-fungi and the edible morels; perhaps the common yeast is an ascomycete. The name of the group is derived from the fact that the spores are developed in delicate sacs, each sac being called an ascus; while the spores within these asci are known as ascospores. See FUNGI.

As'cospore (in plants). An asexual spore produced by the ascomycetes.

As'cus (in plants). A sac producing spores, characteristic of the ascomycetes.

Asex'ual Spore (in plants). A spore which has not been formed by the union of two cells, that is, in a sexual way. Ordinarily, the asexual spore is formed by cell division. Its power of reproduction is the same as that of the sexually formed spore, the difference between the two being simply one of origin. Asexual spores are common among all groups of plants. They are the spores most commonly seen in connection with the flowerless plants, and among the flowering plants, the so-called pollen grains are asexual spores. See SPORE.

Ash, a tree common to Europe and on the North American continent, of the genus *Fracinus* and family *Oleacea.* According to its variety it is valuable economically as timber used by carpenters, coachmakers and wheelwrights, as well as picturesquely for its ornamental and shade purposes. The varieties of the ash are many, including the common ash, native to the British Isles; the white or American ash, with a light bark and pale green leaves, abundant in Canada and in the United States west to Minnesota and Texas; the red ash, met with in swampy ground in the middle states of the union: the black ash, native to New England and west to Missouri, and with its soft though tough wood, useful for barrel hoops and staves; besides the green ash, prized for its ornamental beauty in the middle states and the west; and the mountain ash or rowan tree (a species of *Pyrus*), allied to the ash tree proper only in its leaves. The two varieties familiar in the middle and northern states are the white and the black ash, and these are the most useful for their tough, yet easily worked wood, as well as for their ornamental purposes as a shade tree.

Ashan'ti or **Ashantee,** lately a negro kingdom in western Africa, on the north of the Gold Coast. Formerly, it was shut off from the seaboard by the Gold Coast colony, eighty miles broad, an English protectorate. Since 1896, it has become part of the northern territories of the Gold Coast under a British protectorate, and is governed by a British resident agent. Its exports are gold, palm-oil and india-rubber. Its population is from one to one and one-half millions, one fifth of whom are warriors; area of Ashanti, the Gold Coast and protectorate, about 82,000 square miles. The land is tilled near the towns, but elsewhere is a dense forest. The natives manufacture beautiful cottons, earthenware and sword-blades. They have been wont to practice human sacrifice and are polygamists, the king being allowed 3,333 wives. The capital is Coomassie (*Kumasi*).

The people of Ashanti probably came from north of the Kong Mountains. They were first heard of in 1700, when a powerful king, Osai Tutu, conquered several neighboring states. They have fought two wars with the English and lately one with the French. In 1900, there was a serious rising at Kumasi against the English, who for a time were besieged in the city, but were relieved by a force from the coast.

Progress is going steadily on, Kumasi being linked with Obassi and the coast at Sekondi by a railway 168 miles long, built at a cost of $9,034,000. The census of 1911 estimates the population in the northern territories (those beyond the eighth parallel of north latitude) at 357,569, distributed over a territory between 38,000 and 50,000 square miles in extent. They are administered by a commissioner and commandant with headquarters at Gambaga. The revenue in 1910, derived largely from caravan taxes, was $188,105, the expenditures $586,990, and the grant in aid $68,800. Permanent roads are being made, light steamers are plying the Volta and a silver currency has been introduced with increasing benefits. Kumasi, the chief town, had in 1905 a population of 5,940

Ashe'ville, N. C., the capital of Buncombe County, North Carolina, a central railroad point in the state, 210 miles west of Raleigh. Situated in the Blue Ridge Mountains and comparatively close to the Smoky Mountains of Tennessee, it has become a noted health resort. Here is Asheville College for Women, a Methodist institution, founded in 1843. Asheville is the seat of an extensive trade in tobacco. Population, including suburbs, 34,000.

Ash'land, Ky., a city in Boyd County, on the Ohio River, opposite to and a little to the southeast of Ironton, O., and about 145 miles southeast of Cincinnati. It is reached by the Chesapeake & Ohio, the Norfolk & Western and other railroads as well as by steamers on the Ohio. Settled early in the fifties, Ashland became a city in 1870 and is today governed by the revised charter of 1894. Besides Central Park, a pretty, recreative area of 50 acres in the heart of the city, it has other pleasure resorts without the city limits, especially Cliffside Park. The town is important as a manufacturing and shipping center, and has an extensive trade in coal, iron ore, sheet steel, wire rods and nails, brick, lumber, furniture, leather and other products of its industrial establishments. Population, 20,000.

Ashland, Wis., capital of Ashland County, Wis., in the northern section of the state, situated on Chequamegon or Ashland Bay, Lake Superior, 60 miles east of Duluth, 180 miles from St. Paul, 250 miles from Milwaukee and 410 miles from Chicago. It is the center of a large lumber, brown stone, and iron mining trade, and its position on the lake contributes to the commerce and expansion of the city. It is, moreover, the terminus of four railroads. It has a number of churches and schools and several charcoal blast-furnaces and other industries. Population, 11,594.

Ash'tabu'la, O., an important railway and shipping center on Lake Erie, 55 miles east of Cleveland and about midway between the latter and Erie, Pa. It possesses a good harbor, and has a large trade in shipping coal from Ohio and Pennsylvania mines and iron ore from Northern Michigan. It is a station on the Lake Shore and Michigan Southern Railroad, and has railroad connections besides with the New York, Chicago and St. Louis and with the Pittsburg, Youngstown and Ashtabula division of the Pennsylvania Lines. It has become an important manufacturing center. The town has some fine public buildings and has electric railroads and other modern equipments. Population 24,000.

Ash Wednesday, the first day in Lent; so called from the old church custom of sprinkling ashes on the head as a sign of penitence. The ashes are those of the palms consecrated on Palm Sunday. This custom was probably established by Gregory the Great (590-604). It is observed by the Roman Catholic church. The day, but not the ceremony, is observed in the Church of England.

Asia (*ā'shȧ* or *ā'zhȧ*), the largest continent of the world, lies wholly within the Northern Hemisphere, with a few adjacent islands extending south of the equator. The name is probably derived from an Assyrian or Hebrew word meaning the "rising sun." The continent is bounded on the north by the Arctic Ocean, on the west by the Pacific Ocean, on the south by the Indian Ocean, on the southwest by the Suez Canal, on the southeast by Bering Strait, on the northwest by Europe. The natural western boundaries are the Ural Mountains, Caspian Sea, Caucasus Mountains, Black Sea, Ægean Sea, Mediterranean and Red Seas. The length from north to south is 5,300 miles, from east to west over 5,500 miles. Asia extends over an area of 17,057,000 square miles, which is one-third of the dry land of the globe. Islands comprise one-fifth of this area.

The immense coast line of 35,000 miles is very irregular. The chief ocean inlets on the south are the Gulf of Aden, Arabian Sea with its inlets, Gulf of Oman, Persian Gulf, Gulfs of Cutch, Cambay and Manar, and Bay of Bengal, with the Gulf of Martaban. On the east or Pacific Coast, the chief inlets, proceeding north, are the China Sea with the Gulfs of Siam and Tonkin, Eastern Sea, Yellow Sea (or Hwang-hai), with the Gulf of Chihli (or Pechili), Japan Sea with the Gulf of Tartary, Sea of Okhotsk, and Bering Sea with the Gulf of Anadir. On the north or Arctic Coast the chief inlets are Nordenskjöld Sea and Kara Sea with the Gulf of Ob. On the southern coast are the peninsulas of Arabia, India and Indo-China. The east has many insular and peninsular projections. Large islands to the southeast connect the continent with Australia, and a multitude of smaller islands are scattered over the Pacific and Indian oceans. The larger islands are Sakhalin (or Saghalien), Japanese Islands, Philippine Islands, Borneo, Sumatra, Java, the Celebes, the Moluccas, Papua, Ceylon, the Kurile Islands, Ryukyu (or Loochoo) Islands, Formosa, Hainan, Andaman and Nicobar Islands in the Indian Ocean, and Cyprus and Rhodes on the Mediterranean Coast. The Lyakhov (or New Siberian) Islands is the largest group.

Surface. The mountains of Asia are of great extent, and the highest in the world. The continent is one of vast plateaus, and elevated valleys, although there are also large portions that are low and flat, especially in Siberia, extending from the Ural Mountains across the northern part of the continent, and in the west central region, where an area of great depression ends in the Caspian Sea, eighty-three feet below sea level. The highest point in the continent is Mt. Everest, which is 29,141 feet high. The lowest point is the Dead Sea, which is 1,290 feet below sea level. The greatest mountain system is the Himalayas, near the center of the continent. It rises above the line of perpetual snow for its full length, and extends for 1,500 miles from northwest to southeast. It varies in breadth from 100 miles to 500 or 600 miles. It is broadest at the elevated tableland of Tibet, which has a mean height of 15,000 feet. The chief passes of the Himalayas are the highest in the world, ranging from 16,000 to 19,000 feet in height. The Kuenlun summits are 22,000 feet high. Next to Mt. Everest, the highest peak is Kanchanjanga (or Kunchinjunga) which rises to a height of 28,225 feet.

The Tien-Shan mountain system connects with the Himalayas by the Pamir Plateau, which is called the "roof of the world." It is of great political and strategic importance, as it is situated at the junction of Turkestan, Afghanistan, and India. Its valleys have elevations ranging from 11,000 to 13,000 feet. The junction forms a huge knot from which the Tien-Shan mountains run northwest for 1,200 miles. From the Himalayas the land descends by successive slopes to the plains of northern India, 1,000 feet above sea level. The Himalayas also connect with the mountains in the interior of India, Baluchistan, Afghanistan, China and Indo-China. Mountains form an elevated plateau from the Mediterranean to the river Indus. It is of great elevation on the north, where Mt. Demavend in the Elburz range rises to a height of 18,460 feet, and Mt. Ararat to 17,090 feet. The Tien-Shan system is continued on the northeast by the Altai mountains, separating China from Russian Turkestan and the Siberian region.

The Tibetan plain is very rugged, and intersected by mountain ranges. Some of the largest rivers of the continent have their source there. A large portion of western Asia, from the Indus River to the Mediterranean, from the Persian Gulf to the Caspian Sea, is the Iran plateau, which comprises Afghanistan, Baluchistan, Persia, Armenia, and Asia Minor. This great plateau is from 2,000 to 8,000 feet above sea level. The eastern half is wholly unproductive. Siberia is the chief plain, a vast alluvial tract sloping to the Arctic and traversed by large rivers. It is characterized by vast peat swamps known as tundras, and the southwestern steppes and deserts. The eastern part of China is an alluvial plain which extends over an area of 200,000 square miles, chiefly highly cultivated. There are plains in Hindustan along the southern slopes of the Himalayas. Iraq, watered by the Tigris and Euphrates, is a fertile plain which could be one of the richest agricultural districts in the world.

There are extensive desert regions, forming an almost continuous line from the African deserts through Arabia, Persia, Baluchistan, to the Indus River. The largest desert in Asia is the Gobi, chiefly sand and rock, which forms the greater part of Mongolia. There are also great deserts in Persia, Arabia, and India.

Rivers. Asia has some of the largest rivers in the world. So great is the continent that many of its large rivers never reach the ocean, but are lost in the sand or salt lakes. In western Asia, the Tigris and Euphrates rise in the Armenian plateau and fall into the Persian Gulf. The Indus rises in Tibet, flows through Hindustan to the Arabian Sea. The Ganges has its source in the Himalayas and empties into the Bay of Bengal, as does the Brahmaputra, which rises in Tibet, and the Irawaddy and Salween, which come from the mountains of Indo-China. The Mekong also rises in these mountains and empties into the south China Sea. The great rivers of China, the Yangtze and Hwang Ho, rise in Tibet and wind easterly to the ocean. The Amur, which rises in Mongolia, takes a circuitous course to the Sea of Okhotsk. The great rivers of northern Asia are the Lena, the Yenesei and the Ob. The Ob is the largest river in Asia, extending 3,200 miles. Its basin is believed to be one of the five largest in the world, as it extends over an estimated area of 125,000 square miles. The Yenesei is fed by a mountain lake in the south of Siberia, which has an area of 12,500 square miles. In the center of Siberia lies Lob Nor, a huge swampy tract, neither lake nor river, where once extended a great sea.

Climate. There is a complex variety and distribution of climate in Asia, the mean temperature of which ranges from nearly zero in Arctic Siberia to nearly ninety degrees in Arabia. The lowest temperature is 100 degrees below zero, the highest 120 degrees above zero. On the tablelands and north of the main mountains the climate is dry and temperatures are extreme, ranging from long severe winters to short, hot summers. Central Asia has extremes of heat and cold, and great deficiency of rain. South of the mountains and on the Pacific the climate is tropical but modified by the altitude and the monsoons (or rain-winds) from the southern seas. The trade winds are also powerful influences. Rainfall varies from five inches annually over the Aral district to 550 inches, the heaviest rainfall in the world, on the Khasi Hills, northeast of the delta of the Ganges and the Brahmaputra.

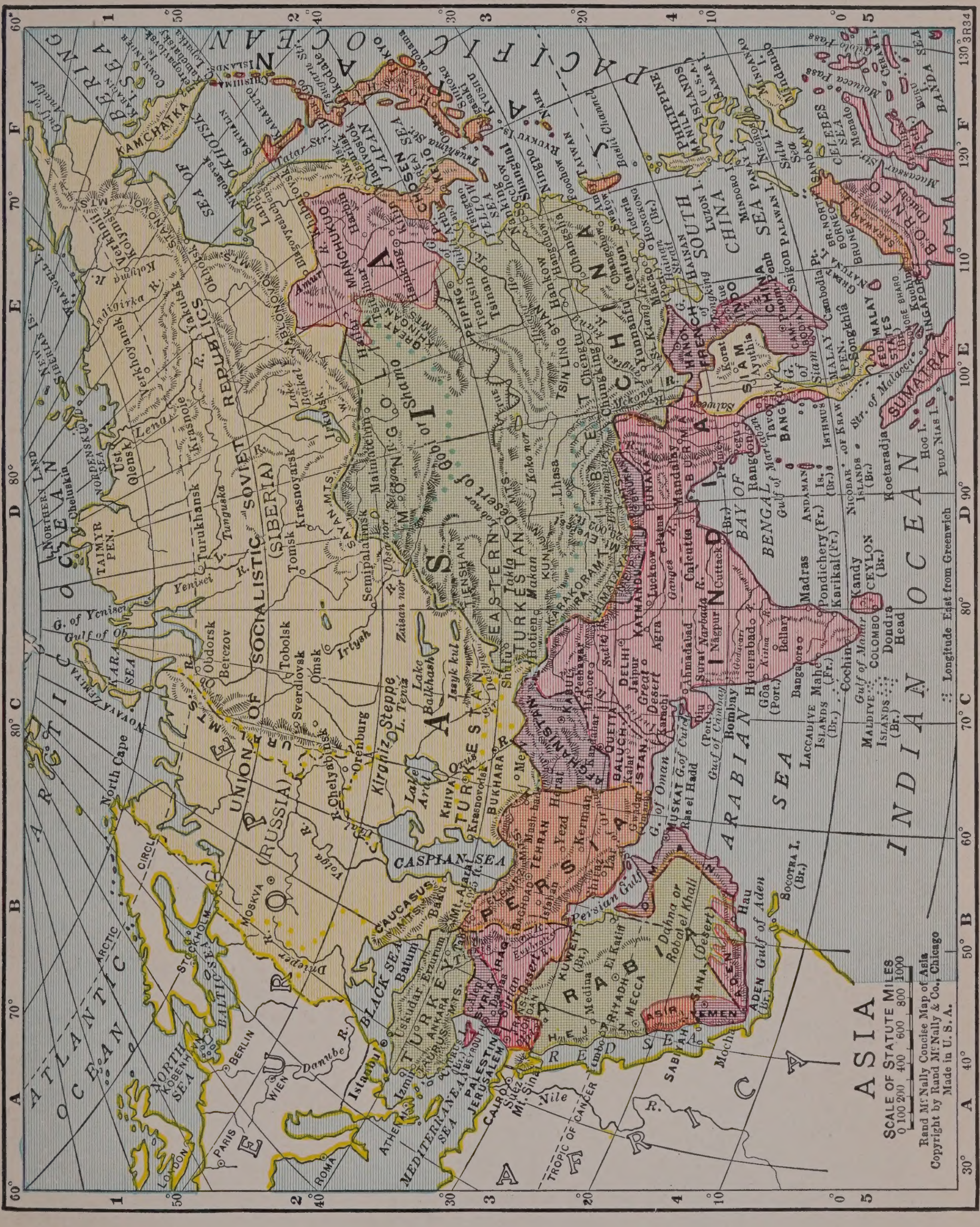
Plant Life. Little land is cultivated in Siberia, and the vegetation is scanty, but the pine, larch and birch trees are to be found in the mountains, and the willow, alder, and poplar in the low regions. Every variety of vegetation is to be found on the slopes of the Himalayas. Phanerogamous plants grow at a height of 19,500 feet there. The rhododendron grows at a height of 14,000 feet, and conifers, trees of the temperate zone, and cultivated lands are to be found on the slopes at heights varying between 4,000 and 10,000 feet. The lower slopes are almost exclusively tropical in vegetation. South of this mountain system the plant life is tropical. The soil of the entire southern region of Asia is good, and there is rich vegetation wherever the moisture is sufficient.

The forests of India contain a variety of trees, the most important of which are teak, sal, deodar, bamboo, palm, sandalwood, laurel, oak, and fig. The principal crops are barley, wheat, rice, maize, millet, sorghum, tea, indigo, jute, and opium. Some of the coast of Arabia is fertile, but most of it is barren and desolate. In parts of Arabia, Persia, Afghanistan and Baluchistan the high hills give good rainfall. There the date palm and aromatic shrubs grow in the desert, and wheat, barley, cotton, and indigo are cultivated. Fleshy plants grow in the arid portions, and gum-producing acacias are common to Arabia and Persia. In the Caspian lowlands the vegetation is of the saline type. This is the native country of the melon.

In southeastern Asia many crops carefully cultivated elsewhere grow wild. The chief of these are sugarcane, rice, cotton, indigo, pepper, cinnamon, cassia, clove, nutmeg, cardamons, banana, cocoanut, areca, sago palm, mango, caoutchouc, gutta percha, and various drug-producing plants. The flora of this region alone numbers 12,000 species. The Chinese flora is much like that of India. North China is especially well wooded and watered, with fertile soil, well cultivated, and products like the temperate zone. Cultivated crops are chiefly wheat, rice, cotton, indigo, sugar, tea, tobacco, coffee, pepper, mangoes, plantain. The Japanese Islands are generally fertile, rich in pines, and extensively cultivated. The other islands are mostly tropical in vegetation.

Animal Life. Almost all the mammals of Europe, and many others besides, are to be found in Asia. The tiger is the most characteristic, commonly found from Armenia across the entire continent, except for part of Siberia and Tibet. The lion ranges over Arabia, Persia, Asia Minor, Baluchistan, east to India. Quadrumana are rare in the continent, but Carnivora are numerous, especially bears, wolves, weasels, moles, shrews and hedgehogs. The rodents are well represented by marmots, pika, jerboa, rats and mice. There are numerous species of wild sheep, and antelope. The musk deer is characteristic of the many kinds found in Asia. India is noted for the many kinds of monkeys, and elephants. Lions, tigers, leopards, bears, civets, ichneumons, rhinoceros, buffalos, and oxen, are common there. The horse, ass and camel are native to Asia.

Among the marine animals, there is a peculiar species of dolphin in the Ganges, and the dugong has its home in the Indian Ocean. Fish of many varieties abound, especially in the rivers. The salmon are to be found in the rivers which flow into the Arctic and northern Pacific oceans, and trout in the feeders


ASIA

SCALE OF STATUTE MILES
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Longitude East from Greenwich
3R34

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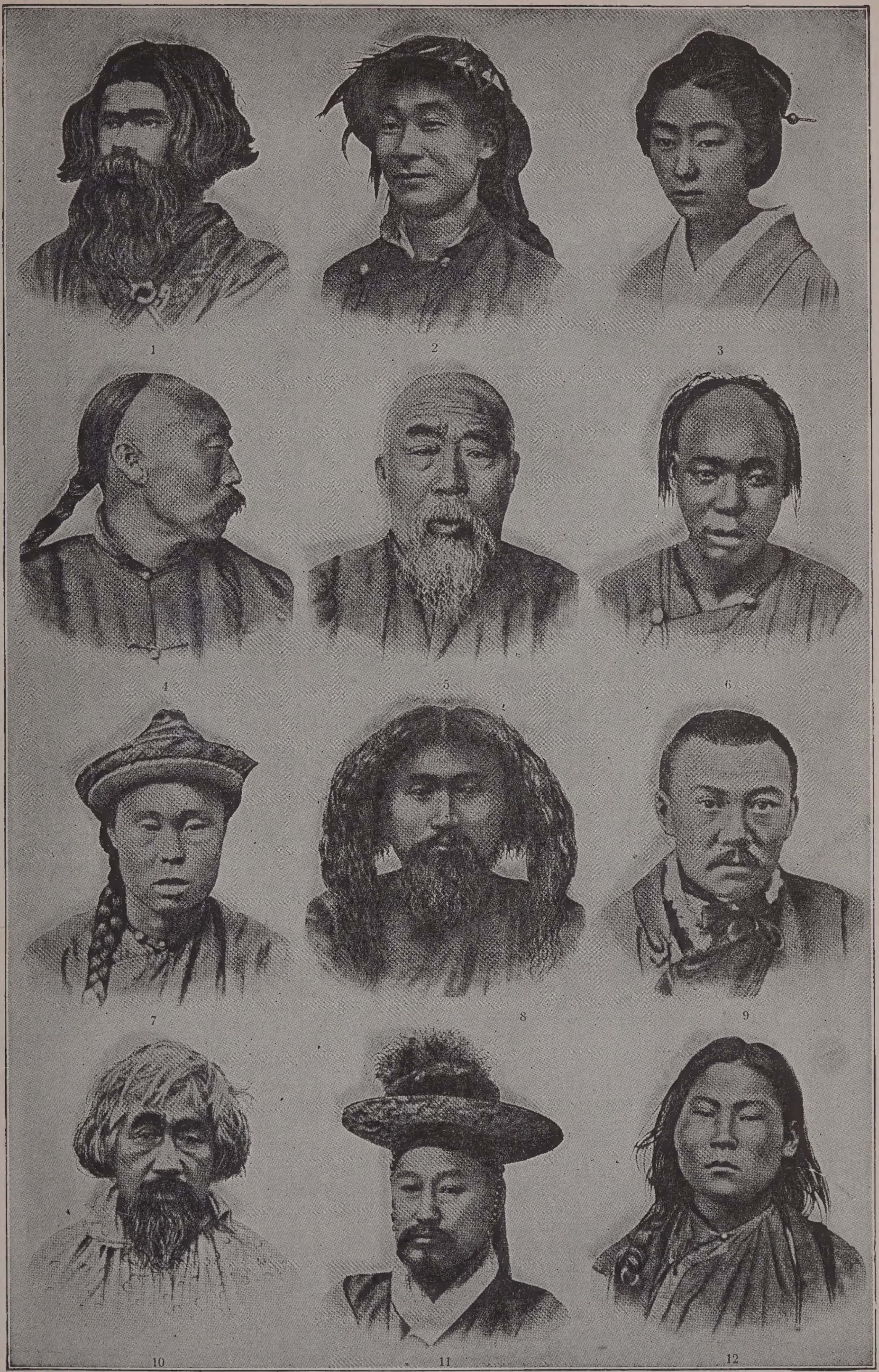
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ASIATIC TYPES
1 Ainu of Japan 2 Chinese 3 Japanese Girl 4 Shiba Man 5 Manchu 6 Golde 7 Mangune
8 Giljak Man 9 Buriat 10 Katjinz 11 Korean 12 Giljak Woman

of the Indus and the Caspian Sea. Sturgeon are common in the Caspian and Black Seas. Among the more remarkable fish of Asia are the climbing perch and the eriapthalmus. The goldfish are native to China, where numerous varieties are to be found. Reptiles chiefly inhabit northern Hindustan, the southeastern peninsula, China, and the islands of Ceylon, Sumatra, and Java. The waters of the Ganges and other large rivers are infested by the crocodile, of which the helmeted and double-crested varieties are numerous in various quarters. The Cobra de capello and the Ceylonese tic-palonga are deadly. There are large pythons also, and frogs, toads, fresh-water tortoises, and terrestrial and aquatic lizards.

Birds of nearly every order except the ostrich are to be found on this continent. The most characteristic are the pheasants. The wild pheasant is peculiar to northern Asia, and the golden to the northeastern portion of the continent. Other characteristic birds are hornbills, peacocks, Impey pheasants, tragopans and other gallinaceous birds, and numerous passerines.

Minerals. Geologically, Asia is one of the newest continents in the world. The mountain chains are chiefly of granitic rock, and yield an abundance of good building stone. The Himalayas greatly resemble the Alps in their mineral structure. Lead ore, copper and silver are found in the Altai Mountains, and the Kuenlun yield rubies, lapis-lazuli, and turquoise The eastern part of the Urals is rich in iron and copper, and the Caucasus Mountains yield gold, petroleum, and basaltic porphyry.

So rich in minerals is Asia that there is hardly a country that does not contribute its share. The coal fields of China are the largest in the world. They produce annually an average of 29,000,000 metric tons from an area of 133,513 acres. Iron ores are abundant in China, which possesses the oldest iron industry in the world in Shansi, and among the richest iron deposits in the world at Tayeh near Hankow. Since 1908, China has produced more than sixty per cent of the world's total antimony. Oil, petroleum, salt, are other important minerals of China.

The Siberian region also has some of the largest known coal resources, extensive iron deposits, and rich non-ferrous metals especially copper. The highest grade lapis-lazuli in the world is produced at Badakshan in Afghanistan, a country which also yields copper, lead, iron and gold. The most important source of mica in the world is India. A great variety of minerals are found here, including coal, petroleum, salt, zinc, silver, lead, manganese, gold, iron, tin, copper, tungsten, saltpetre, nickel, ruby, sapphire, zircon, gypsum, bauxite, ochre and diamonds. Gold is also found in Siberia, Siam, Borneo, Tibet, Japan, Korea (Chösen), and Formosa. Diamonds and other precious stones come also from Borneo and Ceylon.

There are many rich stores of unworked minerals, notably in New Guinea, Persia, and parts of Turkey. In many countries the mines are worked by very primitive methods, producing far less yields than might be obtained by modern ways. Tin is an important mineral in Indo-China, the Malay States, and Siam, which has extensive and varied mineral resources. Oil is successfully produced in Iraq, Persia, and parts of the Asiatic U.S.S.R.

Population. The Mongolian race is typically Asiatic, and most important on the continent of Asia. It includes about three-fifths of the total population, and is located chiefly in China, Indo-China, Tibet, Siberia, Turkey, Turkmenistan, Korea (Chösen), and Japan. The Mongolians are partly a settled race, partly nomadic. The Aryan family of the Caucasian race comes next in order of numbers. The Aryan people are the most civilized in Asia. They were dominant until the Mohammedan conquest, and are still the most numerous in India. They are also to be found in Afghanistan, Armenia, Baluchistan, Hindustan and Persia. The Semitic family, also Caucasian, is represented by the Jews and Arabs, located chiefly in southwestern Asia. There are many others, chief of which are the Malays in the East Indies, Formosa, Malacca and the Philippines; Eskimos near America; Negritos in the Philippines and tropical Asia; Ainus of Japan; and hundreds of local, apparently unrelated tribes. The total population of Asia is estimated at 970,000,000.

Political Divisions. The following is a list of the independent countries of Asia:

China includes China proper, Mongolia, and Tibet, and the New Dominion.

Japan includes the island of Japan, and Formosa, Korea (Chösen), and the southern half of Sakhalin.

Persia, although obligated to Great Britain for loans, is independent.

Afghanistan, by treaty with Great Britain, is now independent.

Saudi Arabia, Kingdom of, is a region composed of a large part of Arabia. In 1932 the name of the Kingdom was changed to Saudi Arabia. It was formerly known as the Kingdom of Hedjaz and Nejd.

Siam is a peninsular kingdom which consists of seventeen provinces.

Turkey, which lost almost all of its Asiatic possessions in the World War, has since regained most of Asia Minor.

Iraq, formerly under British mandate, has been an independent state since October 4, 1932.

Manchukuo, formerly Manchuria, a Chinese province, has been an independent nation since March 1, 1932.

The following list includes the colonies and mandatories of the various countries.

Great Britain has the colonial possessions of India and dependencies, Aden Protectorate, Sokrata Islands, Kuria Muria Islands, Bahrain Islands, Ceylon, Cyprus, Straits Settlements, Federated Malay States, Unfederated Malay States, Hong Kong. The British mandates in Asia are Palestine and Transjordan.

France has the colonial possessions of Indo-China, Cochin China, Annam, Cambodia, Tonkin, Laos, Kwang Chau Wan, Pondicherry and four other colonies in India. The French mandates are Syria and Lebanon.

Russia has a part of the Union of Soviet Socialist Republics, Turkmenistan, Uzbekistan, Tazhikistan, Yakutsk Republic, Buriat-Mongolia Republic, Siberian regions, Transcaucasian Socialist Federal Soviet Republic.

Japan has the mandates of Marianne, Caroline and Marshall Islands.

Netherlands, Kingdom of, has the colonial possessions of the Dutch East Indies.

The United States of America has the colonial possession of the Philippine Islands.

History. In Asia history began. In Asia Minor originated man's oldest monuments and records outside of Egypt. Though Babylonian civilization ceased two thousand years ago, its contemporary exists yet in China. In Asia arose every great religion—Brahmanism, Buddhism, Christianity, Islam, Judaism and Zoroastrianism. (Confucianism is not a religion but a code of conduct.) Confucius, Gautama the Buddha, Mohammed, Moses, Paul and Zoroaster were Asiatics, but each affected the world as powerfully as Alexander and Cæsar.

The Aryans, possibly from east of the Caspian and north of the Hindu Kush, invaded Persia and India. Persia became the first world-empire, extending her dominion under Cyrus to the confines of Greece. Alexander in turn invaded Asia 330 B.C., conquered Persia, extended his power into India, and carried Greek ideas and culture from the Bosporus to the Indus and Oxus. On the death of Alexander his empire fell to pieces and subsequently all western Asia came under the dominion of Rome, including Arabia in part, Asia Minor and Syria; Constantinople inheriting and holding this region for seven centuries after. The power of Islam, dating from the seventh century, became dominant, building empires between the Mediterranean, Ganges and Caspian on the wreckage of Rome and extending its sway into Egypt and India. Palestine became a stage (1100-1300) for the wars of religion called crusades. Turks and Tartars issued from central Asia (1215-1415), destroyed the Saracen, Muscovite and Byzantine empires, and overthrew China temporarily. The Ottoman empire was established, however (1300), drove back the Mongols and in 1453 captured Constantinople. Mongols founded an Indian Empire (1525-1857) whose rulers included two of the best and ablest among monarchs, Akbar and Aurangzeb.

Portugal found a searoad to Asia around Africa to India (1497), China (1517), and Japan (1542), and initiated Asia's modern era. Russia started across Siberia (1580), Holland gained footing in the East Indies (1596), England's East India Company arrived in 1600, and France entered India four years later. England's Indian empire began in 1757, and France, failing in Hindustan, built an empire in Indo-China during the 19th century. America brought Japan into modern life (1854), though the Dutch had influenced it through commerce for two centuries, and in fifty years it entered among the world-powers. A war between China and Japan (1894) resulted in the cession of Formosa to Japan. The Philippines were transferred to the United States (1898) at the close of the Spanish-American war. A war between Russia and Japan (1904-5), a most sanguinary struggle resulted in victory for Japan, with added prestige, the cession of part of Sakhalin and the control of Korea.

For further information see the following articles:

Countries: AFGHANISTAN; ARABIA; ASIA MINOR; ASSYRIA; CHINA; CYPRUS; DUTCH COLONIES; FORMOSA; FRANCE; GREAT BRITAIN; INDIA; JAPAN; KOREA (CHÖSEN); LYDIA; MANCHUKUO; MONGOLIA; NETHERLANDS, KINGDOM OF; PERSIA; PHRYGIA; PISIDIA; PONTUS; RUSSIA; SAKHALIN; SAUDI ARABIA; SIAM; TIBET; UNITED STATES OF AMERICA.

Mountains: ARARAT, MT.; CAUCASUS; GREAT ALTAI MOUNTAINS; HIMALAYA MOUNTAINS; KUENLUN MOUNTAINS; KUNCHINJINGA; THIAN-SHAN MOUNTAINS.

Rivers: BRAHMAPUTRA RIVER; EUPHRATES RIVER; HO; INDUS; IRAWADDY; MEKONG RIVER; OB; YENISEI.

Seas: ARAL, SEA OF; DEAD SEA; OKHOTSK, SEA OF; YELLOW SEA.

Cities: BENGAL; BENARES; DACCA; DELHI; JEYPORE; JAIPIN; BEYRUT; ERFURT; ISPAHAN; TABRIZ; TEHERAN; ERZERUM; FOOCHOW; HANGCHOW; HONG KONG; TIEN-TSIN; IRKUTSK; KHIVA; PEKING.

People: ALEXANDER THE GREAT; CYRUS THE GREAT; HABIBULLAH KHAN; IBRAHIM PASHA; KUBLAI KHAN; MUSTAPHA KEMAL PASHA; TIMUR THE GREAT.

Asia Minor, the name given to the western peninsula of Asia, which forms part of Turkey in Asia. It is bounded on the north by the Black Sea, and the Sea of Marmora; on the west by the Ægean Sea; on the south by the Mediterranean; and on the east by the Armenian highlands and the Euphrates River. On the extreme northwest Asia Minor is separated from Europe by the Straits of Bosporus and the Dardanelles. It extends over an area of 199,272 square miles. The west coast is indented with bays and gulfs, and the interior is a great plateau, 3,500 to 4,000 feet above sea level, with bare steppes, salt plains, marshes and lakes. Along the coast is a parallel range of mountains, from 4,000 to 6,000 feet high, and cut by cross valleys. The highest peak in Asia Minor is Ergish-dagh, which rises 13,100 feet above the plain Kaisarieh. On the north these mountains sink abruptly to a narrow coast. The border ranges on the south are more continuous and higher, with an average elevation of 7,000 feet. On the western border many valleys open on the archipelago. Between the highlands and the sea is the fertile coast land of the Levant. The large rivers all drain into the Black Sea. The climate is very mild on the Ægean Coast. On the southern coast mild winters are followed by scorching summers, and the central climate is more like that of Asia. There is luxuriant vegetation on the north, where the abundant rains promote growth. The forest trees and cultivated plants are European. In the central plateau flocks and herds, horses, camels, Angora goats, are raised. The coasts are rich in fine fruits, olives, wine and silk. There are rich mineral resources, as yet almost undeveloped. The main exports are fruits, olive oil, silk, carpets, mohair, wool, hides.

The dominant race is the Osmanli Turks, who number about 7,000,000 of the total population of 10,427,000. Closely allied are the Turkomans and Yuruks, who live a nomadic life on the tableland, with the Kurds. In the mountains east of Trebizond are the robber tribes of Lazes. Before the World War the Greeks and Armenians were the most progressive and had the most of the trade. The government is administered in eight vilayets with capitals in Brusa, Smyrna, Konia (Iconium), Adana, Sivas, Angora, Trebizond and Kastamuni, and the two independent Sanjaks of Ismid and Bigha.

Asp (*ȧsp*), a name loosely applied to several kinds of venomous serpents. A kind of viper in southern Europe and a snake in India, closely allied to the cobra, have received this name. Several kinds of vipers are found in Palestine, and it is not certainly known to which one the word asp in the Bible refers. Cleopatra's famous asp, by means of which she committed suicide, is believed to have been a snake called the horned viper.

Asparagus (*ăs-păr'ȧ-gŭs*), is a tuberous rooted, perennial herb, which in some varieties is the size of a shrub. It is widely distributed in warm countries of the temperate climes and in the tropics, but is cultivated in all civilized countries. The plant grows wild on the southern coast of England, and on the plains of Russia it so abounds that the cattle devour it like grass. Its varieties number nearly 150, the best and most widely known being the esculent asparagus. For more than 2,000 years it has been cultivated for the succulent young shoots produced from the thick root stocks in spring. It is first grown a year or, if necessary, two years in a nursery bed, then transplanted to a permanent one. Shoots should not be gathered before the second spring after planting in permanent quarters. As a rule the thicker the head the better. The plant yields annually for ten or twelve years. Its important enemies are rust and beetles.

Aspen (*ăs'pĕn*), also known as quaking asp and as white poplar, is a tree of much interest and beauty. It came originally from the cooler parts of Europe and Asia, and belongs to the genus *Populus*. In this country it is distributed generally north of Pennsylvania and Kentucky, and grows on the mountains of the west, south to Mexico. It is a tall, slender tree, and said to reach in the forests to the height of 100 feet. It usually varies from forty to eighty feet. The bark, save at the base, is light colored; the leaves, which are a glossy green above and yellowish green below, twinkle and tremble owing to the arrangement of the long flexible stem and the light leaf-blade. There is much delicate color in the aspen, in the bark, the catkins and the unfolding leaves. It is a prized ornamental tree, grows rapidly, but is short lived. The seeds are wafted a considerable distance by means of the long hairs with which they are surrounded. It is valuable on lands devastated by forest fires, being one of the first trees to spring up in clearings and protecting later growths. It is used in turning and in the manufacture of wood pulp, but is not valued for fuel. The large-toothed aspen is a stiffer, less attractive tree, though the weeping varieties of this are employed for ornamental purposes. Its distribution in this country is from Nova Scotia to Minnesota and south to Tennessee.

See Poplar.

Asphalt (*ăs'fălt*) is bitumen of purer form, being a mineral and solid or semi-solid. Its name comes from *Lacus Asphaltites*, Latin for the Dead Sea, where asphalt once abounded. It is black or brown in color, brittle in consistency (though this varies from a bright pitchy condition to thick masses of mineral tar) and compact. It melts easily about the boiling point of water, burns without making ashes, and emits a thick smoke of pitchy odor. It is widely distributed, especially in tropical and subtropical regions, but deposits of sufficient quantity for commerce and the industries occur only in a few localities. It is a product of the decomposition of vegetable and animal substances, the three preceding products being naphtha, petroleum and mineral tar. Asphaltic stone is limestone impregnated with bituminous matter. Asphalt cement is refined cement tempered with petroleum. Mastic is asphalt cement mixed with powered limestone and sand. Asphalt concrete is crushed stone cemented with mastic and compressed. Simple asphalt is found at Auvergne (France), Caxatambo (Peru), Cuba, southern California, Switzerland, Trinidad (an island off Orinoco River) and Venezuela. Colorado, Italy, Kentucky, Oklahoma and Utah also contribute. Asphaltic limestone occurs largely in Europe. Auvergne once supplied most asphalt, Caxatambo exports a very pure variety of high luster, Cuba yields considerable asphalt of fine quality, but the supreme sources of supply in quality as in quantity are Trinidad, California and Bermudez in Venezuela. Trinidad contains a lake of asphalt about one mile in diameter, and containing perhaps 6,000,000 tons. An American company exports 100,000 tons a year from this lake to the United States, the supply partly renewing itself by a constant flow of soft pitch from subterranean sources. Bermudez, where an asphalt lake covers 1,000 acres, exports very pure and hard asphalt. In California asphalt was discovered in 1879, and about 1894 beds of very pure, high grade, liquid asphalt were found, which even in its natural state already has the proper consistency for paving. The value of our domestic product almost equals that of the imported product.

Bituminous rock, which is principally used for paving streets, is usually shipped unrefined, and mixed at the place of use with other ingredients. Raw asphalt generally is impure, and must be refined before it can be used. It is manufactured into a cement by mixing it with other forms of bitumen, this cement being used to bind particles of limestone and sand in an asphalt pavement. First the asphalt is melted, the residuum from petroleum being added and this mixture being the paving cement. Clean, sharp sand, heated to 300° is added, and carbonate of lime last. The three substances are mixed thoroughly, and the product is the mixture used in paving streets. Asphalt is most used for street paving, but it is employed also for the distillation of lubricating and illuminating oils, for cements, for making black Japan varnish, drainpipes of compressed asphalted paper and roofing felts, or paper waterproofed with asphalt, and for waterproofing foundations in bridges and buildings.

Paving streets with asphalt is a simple process. The street is graded solidly to within eight inches of the proposed surface,

Asquith, Herbert Henry, Ex-Premier of England. Born at Morley, Yorkshire, September 12, 1852, and educated at Oxford, he became a lawyer, was appointed Queen's Counsel in 1880 and in 1886 elected to Parliament. He was made Home Secretary in Gladstone's last Cabinet; appointed Chancellor of the Exchequer under Campbell-Bannerman (q. v.) and at his death, succeeded him as Premier. Owing to criticism of his policy in the European War he resigned the premiership in 1916 and was succeeded by Lloyd-George (*q. v.*) his minister of war.

Aspinwall. See Colon.

Ass. The ass, originally domesticated from the wild ass of Abyssinia, differs from the horse in its smaller size and its long hair tufted at the end of the tail. Its fur is usually of a gray color. The unwillingness it shows to cross the smallest stream and its fondness for rolling in the dust point to arid deserts as probably its first home. Its reputation for stupidity is very old. The Egyptians represented an ignorant person by the head and ears of an ass. In the middle ages the Germans of Westphalia made the ass represent Thomas, the unbelieving apostle, and the boy who was last to enter the school on St. Thomas' Day was called the "Ass Thomas." In southern Europe, the ass has been carefully bred and thus greatly improved. The small size of the animal in cold countries is as much due to neglect as to the climate. In Kentucky, where they are used in breeding mules, being well cared for, they are fifteen hands high on an average; while in the north of India, where they are used by the lowest castes, they are no taller than a Newfoundland dog. In Syria and Egypt the ass is seen at its best, and is highly prized as a domestic animal. Its milk is very valuable for invalids. Wild asses are hunted in Persia.

Assam (ăs-săm′), a province of British India, situated north of Burma in the valley of the Brahmaputra, acquired by the British in the Burmese War in 1824, and now under the jurisdiction of a British Chief Commissioner. Its area, still largely covered with jungle, in which roam elephants, tigers, leopards and other wild beasts, is 49,004 square miles in extent, with a population, chiefly Hindus and Mohammedans, of about five and a half million. Assam has a heavy annual rainfall, with a climate of moderate temperature; the region, however, is subject to earthquakes. Its chief exports embrace tea, rice, rubber, silk, cotton, ivory and gold; it has also much coal; while petroleum and iron, though as yet undeveloped, are known to exist. In the higher elevations there is much timber. The soil in the valleys and along its chief river, the Brahmaputra, is very fertile, though the excessive rains inundate the land and at seasons imperil the tea-plantations and the rice crop. See Cumming's *With the Jungle Folk* and Hunter's *Statistical Account of Assam*; also Bronson's *Dictionary in Assamese and English.*

Assay′ing is the art of finding how much of a given metal there is in a metallic ore or alloy—as, the amount of iron in a specimen of iron ore or the amount of silver in a silver dollar. The term is applied particularly to processes carried out chiefly by fusion or fire assaying; but the word is also applied as wet assaying to the commercial analysis of many things where chemical solvents and reägents are used. Assay processes vary with different metals, but the method used with silver ore will serve as an illustration. The first process is called scorification. One part by weight of ore is mixed with from ten to twenty times its weight of granulated lead and half its weight of borax. This mixture is put in a fire-clay dish, called the scorifier, and heated to redness in a furnace having a compartment or muffle open to the air, called a muffle furnace, until the substances are thoroughly melted. The surface of the molten lead now shows in a circular space in the center of the scorifier, while the earthy materials form a slag which forms a ring around this circle. The heating is continued until a considerable part of the lead has been oxidized to lead oxide. This goes into the slag and increases its amount so that the slag finally covers the diminishing metallic lead. Then the melted mixture is poured into a mould, and, on cooling, a lead button is seen which can be detached from the slag. The lead has taken up the silver as well as any gold that may be present. The next process is called cupellation. The cupel is a small cup made of burnt bone and is porous. The lead button is put in this vessel, after the latter has been heated to redness in a muffle furnace. The lead and other base metals that may be present are burned or oxidized, and the oxides are absorbed by the porous mass of the cupel, or sent off in the shape of vapor. Silver and gold are not oxidized, hence they remain in the metallic state. Just before the assay is finished, rainbow colors come and go over the button, and a brilliant flashing up of color marks the end of the operation. The silver button left in the cupel is finally weighed. This is one of the simplest methods, but not the only method of assaying. A crucible is sometimes used instead of a scorifier. H. L. WELLS.

As′simila′tion (*in plants*). A term often applied to the manufacture by green plants of starch, sugar and similar substances (carbohydrates). This process is better called photosynthesis (which see), leaving assimilation to be applied to the transformation of foods (carbohydrates, proteids, fats, etc.) into the living substance, protoplasm. Of the details of this very little is known.

Assiniboia (*as′sĭn-ĭ-boi′ȧ*), one of the northwest territories of Canada until 1905, when one part of it was merged in the new province of Alberta and the remainder in the new province of Saskatchewan. The city of Regina was formerly in Assiniboia.

Assin′iboine, an important river in northwestern Canada. The city of Brandon (Manitoba), is on its banks. Runs easterly to the Red River. The Souris and Qu'Appelle Rivers are its tributaries. Runs through a rich agricultural country. Length 450 miles.

Assisi (*ä-sē′sē*), **St. Francis of,** a devout Italian monk, born at Assisi in the province of Perugia, in 1182, and the founder of the Franciscan order. To his tomb, in the Church of San Francesco, Assisi, many thousands from all parts of Europe make annual pilgrimages. The church is enriched by the possession of many remarkable frescoes and paintings by Cimabue and Giotto, which depict stories from the Old and New Testaments and incidents in the life of St. Francis of Assisi.

Associated Press, the largest organization of its kind, is a mutual organization of persons representing newspapers, having for its purpose the collection and distribution of the important news of the world. There are about eight hundred and sixty members. For its more important service The Associated Press has its own leased wires, which form a network across the continent from Bangor, Me., to Seattle, Wash., and San Diego, Cal., and from Duluth, Minn., to New Orleans, Galveston and Tampa, Fla. The total mileage of this leased wire system is approximately: Day wires 22,000 miles; night wires 28,000. From various points along the trunk lines the report is sent to interior cities. Each of its members engages to contribute the news of his immediate vicinage to The Associated Press. The annual revenues, which are derived from assessments levied upon its members, approximate $3,000,000 while the number of words daily received and transmitted at each of the more important offices is over 50,000, or the equivalent of thirty-five columns of the average newspaper. The headquarters are in New York with bureaus at thirty-five other cities in this country and at the important capitals of other nations. It has correspondents all over the world and coöperative relations with the largest similar organizations in foreign lands. It is governed by a Board of Directors, fifteen in number, chosen for three-year terms by the members in annual meetings. It has no stock, no dividends and no profits of any character, its revenue being derived from assessments of its members.

The present organization operates under a New York charter, secured in 1900, and is the outgrowth of several earlier and competing associations.

FREDERICK R. MARTIN,
Assistant General Manager,
Associated Press.

Association of Ideas. By the association of ideas is meant such relations among them as will cause one to suggest others. Through the so-called laws of association psychologists have attempted to explain why a certain perception or thought is followed by certain images, sensations or ideas. Association is supposed to explain those trains of thought in which the mind pursues its own course unguided by the senses, except in so far as the original suggestion may have been a perception.

Early psychologists have many interesting allusions to the mental phenomena that are classed under the head of association of ideas, but before the time of Locke (1632–1704), it was generally assumed that when the mind proceeded to recount in its own way the suggestions of a perception, it followed a certain logical order with greater or less error according to the quality of mind. Locke assumed that when one idea suggests another to which it is related in a logical way, no further explanation of the association is necessary; but where such association exists between ideas having no logical connection, he falls back on the explanation that they have occurred together accidentally in the past, and because of this we have formed the habit of thinking them together, so that when one recurs we immediately call up the others. If the idea *fire* suggests that of *cooking food*, association is not needed to explain the relation; if, instead, *London* is thought of, we wonder and can account for the fact only by supposing that the experience or description of a chance fire in London has proved so influential as to cause the idea *fire* to suggest its habitual associate *London*, rather than its logical or scientific premises or consequence.

Hartley (1704–1757), an English psychologist, uses the idea of association by habit to explain not merely the curious and arbitrary associations of ideas but the logical ones as well. All mental processes are, according to him, dependent on the processes in the brain. Those brain processes that occur together become associated by habit so that the re-excitement of one will cause the re-excitement of the others, and the corresponding ideas will come successively into consciousness. The discoveries of modern experimental psychology make it possible to state still more definitely the character of the associations in the brain. It is known that visual consciousness is dependent upon the excitement of structures in the rear of the brain, and that auditory areas lie in the temporal regions. Suppose that, at the time when one sees a cat, he hears the sound of the word cat Then the auditory and the visual structures are excited together. They become so associated that when again we hear the word the nervous currents discharge from the temporal into the occipital or rear portion of the brain, and the visual image of a cat rises in the mind. Apparently the sound of the name suggests immediately the visual image of the thing. Really it is the association of the two portions of the brain corresponding to the two ideas that causes the one to follow the other.

After the time of Hartley, English psychologists attempted to explain all trains of thought on the basis of association. But the knowledge of the anatomy and physiology of the brain was too imperfect to lead thinkers to value highly the theory that all mental associations depend upon habitual associations of brain processes. Instead they interest themselves in a statement of the logical relationships existing between ideas that suggest one another. They find that when ideas are similar or contrasting or come in close succession in time, or when their objects are related as cause and effect or are situated near each other in space, they are likely to call each other into consciousness. Professor James, the American psychologist, points out the fact that such laws of association may be increased indefinitely, and that they do not help one to do anything in the way of predicting the effect of a suggestion on a given mind. In his opinion, and here modern psychology agrees substantially with him, the physiological law of habit is the only real explanatory law of association. When we think logically and when our fancy riots in nonsense, we are following the same fundamental law of connecting those experiences that have occurred together in time.

Professor James, however, finds it necessary to expand his treatment of this law. The same idea may have many habitual associates. How are we to tell which one it will suggest? Other things being equal, the most frequent associate will come up. The idea of *fire* will suggest *cooking* rather than London, because the former has been associated with it much more commonly. If, however, the experience of the London fire was very exciting, as it might well have been in case the fire occurred at a hotel where we were staying, the association of *fire* with *London* might be so intense as to overcome the effect of the frequent association with cooking. Again, if one had just been absorbed in the accounts of the San Francisco disaster the idea of fire might suggest this most recent associate rather than the most frequent or the most intense ones. To know the effect of these principles so that we can predict the result of a given suggestion on a certain mind, it is necessary to know the concrete condition of this mind. Here it is that the subject of the association of ideas connects with that of apperception (*q. v.*). The experience that any new perception or idea calls up and through which it becomes apperceived depends on the laws of association, and the teacher in counting on the force of any suggestion must know the experience of the pupil and apply these laws. No amount of acquaintance with the logical relationships in the material of instruction will help, unless the teacher knows in how far these logical associations have become habitual in the mind of the pupil.

One further condition affecting the working of the law of association needs to be mentioned. The current of one's thought is almost never determined solely by a single isolated perception or idea. The entire contents of the mind, both that which is clearly attended to and that of which one is vaguely conscious, that which is rapidly disappearing from consciousness, and that which is just rising into the mental field, feelings, images and ideas; all are more or less influential in determining what is to come by association. If the suggested ideas are related to all or most of the contents of the mind, we have what Professor James calls total recall. If, however, owing to special interest in one phase of this content the mind attends so closely to it as to call up associates suggested by it but unconnected with the other elements in consciousness, we have partial recall. When this special interesting topic is the thought of a quality, it may suggest some new object known to possess that quality. We may be thinking of the *sequoia* or big trees of California. Our attention may concentrate on the thought of their extraordinary size, and this may lead us to think of elephants. Big trees may never have been thought of in connection with elephants before. We seem to have departed from the law of habit. However, the quality of great size is habitually connected with both objects. Thus the fundamental law of association, when supplemented by the law of the special influence of interesting items, is seen to explain association by similarity, where the mind seems to be taking an utterly original course.

Finally it should be noted that while the English associationists treated the ideas as if they were comparatively distinct and unchanging elements recurring frequently in thought, modern psychologists hold that all mental elements are what they are because of the other elements that accompany them. This view is practically involved in the notion of apperception, for apperception means that the associated ideas suggested by any thought apperceive, interpret and so modify it. After the thought of *sequoia* has suggested the thought of elephants, it can never recur as it was at first. It will henceforth always be the thought of trees that are like elephants in a certain respect,

See Apperception, Memorizing, Psychology for Teachers. Consult *Principles of Psychology* by James, pub. by Holt & Co.

E. N. Henderson.

Assuan Dam (*äs-swän*), **The.** A part of an extensive system of irrigation undertaken by the British government in Egypt. Assuan is about six hundred miles up the Nile and is below the first cataract. By building dams across the Nile at Assuan and Assiut, it is proposed to form two great reservoirs in which to store the water during the annual overflow of the river. By this means a much greater area can be irrigated and brought under cultivation, and the productiveness of Egypt greatly increased. The dam at Assuan is a mile and a quarter long. It consists of a solid wall of granite rising ninety feet above the level of low Nile, and is about sixty feet in width at the top. The plans include a roadway across the top, so that there may be communication between the two sides of the river. There are one hundred and eighty sluices in the dam, each equipped with heavy steel doors which are readily opened and closed by means of levers. It is expected that this dam will form a lake one hundred and forty miles long. The stored up water partially submerges the island of Philæ with its interesting ruins.

Assyr'ia was the northernmost of the three great countries which occupied the Mesopotamian plain. The Niphates Mountains of Armenia were on the north, Susiana and Babylonia on the south, Media on the east and the watershed of the Euphrates on the west. It was about 280 miles long from north to south, and about 150 broad from east to west. There are mountain chains in the north and east, and the country is watered by the Tigris. It is a very fertile region and supported in ancient times a large population. That its people reached a high degree of wealth and civilization is shown by the ruins of mighty cities, by canals and means of irrigation, by inscriptions and carefully kept records of its history—especially the Eponym canon, as it is called, which has been found to agree closely with what is said in the Bible about the Assyrians.

The Babylonian monarchy was already growing old before the Assyrian began. The early rulers were mere governors appointed by the Babylonian kings. Little by little Assyria became independent. She began to be powerful about 1320 B. C., but Tiglath-Pileser I (about 1140 B. C.) was the real founder of the first Assyrian empire. He spread the dominion of Assyria over all western Asia, from Elam to the Mediterranean and from the Armenian Mountains to the Persian Gulf. Under his son the empire decayed as rapidly as it had grown, and for two centuries Assyria played no part in history. It was during this time of decay that the Hebrew kingdom arose and was developed under David and Solomon. In 930 B. C., Assyria began once more to become important. Shalmaneser II began to reign in 858 B. C., and for thirty years engaged in wars that established the power of Assyria over all western Asia. It was this king who in 854 B. C. fought against the king of Hamath, Benhadad of Damascus and Ahab of Israel. In 745 B. C., the throne was usurped by a powerful monarch, Pul, a Babylonian, who took the Assyrian name, Tiglath-Pileser II. He made firm the conquests of his predecessors. In earlier times it had been conquest and spoil that formed the policy of the rulers; now the conquered districts were annexed and ruled by Assyrian governors, who saw to it that a fixed tax was sent year by year to Nineveh. Sargon, who was one of Assyria's great generals, was the leader of a successful revolt of the army against a weak prince. It was he who captured Samaria, in 722 B. C., and carried away 27,000 of its best citizens. Sargon's son, Sennacherib, ravaged Judaea, capturing forty-six cities, and besieged Jerusalem, where a pestilence, referred to in the Bible, attacked his army and saved the city. In 681 B. C. began the reign of Assyria's greatest king, Esarhaddon. He at once set on foot the war which resulted in the conquest of Egypt, and which placed the ancient world for twenty years under one rule, thus giving the world the idea of a universal empire. Under Esarhaddon and his son, Asurbanipal (called by the Greeks Sardanapalus), the kingdom in 650 B. C. reached its height. Afterward revolts took place which slowly ruined it.

The modern area of Assyria (Mesopotamia), in Turkey in Asia, comprises the vilayet of Mosul (area 35,130 square miles; population 500,000), Baghdad (area 54,540 square miles; population estimated at 900,000); and Busra (area 53,580 square miles; population 600,000). The town of Mosul on the Tigris is close to the ruins of Nineveh and 220 miles by water (R. Tigris) north of Baghdad. Busra or Basra contains the town of Korna, where the Tigris and Euphrates join their waters, at the southern end of the ancient dominions of Assyria and then find their way by the Shat-el-Arab southward into the Persian Gulf. Northwest of Korna or Kurna and south of Baghdad is the town of Hillah, on the Euphrates, near the ruins of ancient Babylon and the Arab vilayet from which many Babylonian records have in our modern day been shipped.

Astar'te or Ashtoreth. An ancient oriental deity, supposed to be the moon-goddess, as Baal was the sun-god. She is mentioned several times in the Old Testament (I Kings XI: 5-33: II Kings XIII: 13). King Solomon built an altar to her. She was sometimes represented as having four wings and bearing a dove in one hand. She was worshipped by the Phœnicians, the Carthaginians, the Sicilians and by the inhabitants of Cypus.

As'ter, a flowering plant of the thistle family, found largely in North America, some species to be found in most regions of the globe. The word means star. In England they are called Michaelmas and Christmas daisies, because they have heads like daisies and when the weather is mild they bloom as late as those periods of the year. One variety grows at a considerable height on the mountains of Europe. The wild asters of the United States are many and beautiful, there being over a hundred native species. Several months of the year they clothe the land in royal bloom, a large part of the glory of the American autumn. The aster has been suggested as the national flower, its range is so general and it blooms so profusely.

"And everywhere the purple asters nod
And bend and wave and flit."

The purple or blue asters are very numerous, ranging from the low-growing seaside aster to the tall New England aster, sometimes reaching eight feet in height. The golden aster seeks the dry roadside, white asters grow in open wood and field and by shady roadside, an abundance of tiny flowers crowning high, wide-spreading branches. A variety of the Chinese aster, having beautifully colored florets of rose, violet, and white, is called *Reine Marguerite.*

As'teroids, a series of small planets, sometimes called minor planets, which revolve about the sun in periods varying from three to eight years. More than 500 of these bodies have been discovered, all having orbits lying in the space between Mars and Jupiter. Practically all of these planets are so small they can be seen only with a telescope; though Vesta, which is the largest, can at times be seen with the naked eye. Their diameters probably range between 10 miles and 400 miles.

In recent years many asteroids have been discovered by photography. If any portion of the sky is photographed with a camera attached to a telescope, the fixed stars will appear as points; but if there be an asteroid in the field of the camera, its image will be a short straight line, for it is moving among the fixed stars.

Of all known asteroids the most interesting are probably Ceres and Eros. Ceres was the first one discovered, having been detected by Piazzi, January 1, 1801. Eros, discovered by Witt of Berlin, August 14, 1898, proves to be our nearest neighbor and promises to offer, by observations of its parallax, the very best of all methods for determining the distance from the earth to the sun. Since this distance is the standard of length for nearly all astronomical measurements, Witt's discovery of this planet must be ranked among the most important astronomical discoveries of recent years. The name asteroid is due to Sir William Herschel.

Astor, John Jacob, millionaire, the founder of the American Fur Company, was born in Germany, near Heidelberg, in 1763. A peasant's son, he went to London in his sixteenth year, and worked with his brother, a maker of musical instruments. In 1783 he sailed to America and invested his small capital in furs. Six years later, by economy and industry, he had acquired a fortune of $250,000. He then sent out two expeditions to the Oregon Territory, one by land and one by sea, to open a regular trade with the Indians. From this time on Astor's ships were found on every sea. He died in New York City in 1848. His estate was valued at $30,000,000. He bequeathed $450,000 for the establishment of the Astor Library in New York City.

His son, William Backhouse Astor was known as the "Landlord of New York." He too made large gifts to the Astor Library. At the time of his death in 1875 the Astor fortune had increased to approximately $50,000,000.

The great-grandson of the founder of this famous family, also named John Jacob, who was born in 1864, was one of the ablest members of the Astor family. He was a successful administrator of the vast estate left to him, and was also an inventor of distinction. He lost his life at sea when the *Titanic* sank on April 15, 1912.

See Astor, William Waldorf; Astoria; Astor Library, The.

Astor, William Waldorf, a great-grandson of the founder of the Astor family fortune, was born in New York City in 1848. He studied law so that he might manage the Astor estate both wisely and well. In 1877 he was elected to the New York State Assembly. In 1879 he was elected to the Senate. President Arthur appointed him Minister to Italy in 1882, a position which he held until 1885. He became a British subject in 1899 and in 1893 he bought the Pall Mall Gazette. He was the founder of the Pall Mall Magazine. In 1916 he was created Baron Astor of Hever Castle. His daughter-in-law, the American born Nancy Langhorne, was elected to the House of Commons in 1919, the first woman member of the British Parliament. In 1917 he was created Viscount Astor. He died in 1919.

Astoria (*ăs-tō'rĭ-ȧ*), a city, port of entry, and the seat of Clatsop County, Oregon. It was originally a fur-trading station situated on the left bank of the Columbia River. It was founded by the Pacific Fur Company in 1811 and named after its chief proprietor, John Jacob Astor. It was main issue in the American claim to Oregon. Its principal industry is salmon-canning. Other important industries include logging, saw, lumber and planing mills. Astoria has a fine harbor and is a railroad terminal. Its shipping interests are therefore extensive. Washington Irving has told the story of the beginnings of Astoria in his book of that name. In 1930 the population was 10,349.

Astor Library, The, New York, now embraced in the New York Public Library, was founded under the will of John Jacob Astor, who left $450,000 for a public library in the city of New York. This sum was increased subsequently to a million by gifts from his son and grandsons. The library was opened in 1854 with 90,000 volumes. In 1895 it had about 300,000 volumes. In some departments, as oriental languages, it is unsurpassed by any library in the country. The Astor library was in 1895 consolidated with the Lenox library, and, with the Tilden bequest, is now housed in the New York Public Library.

See New York Public Library.

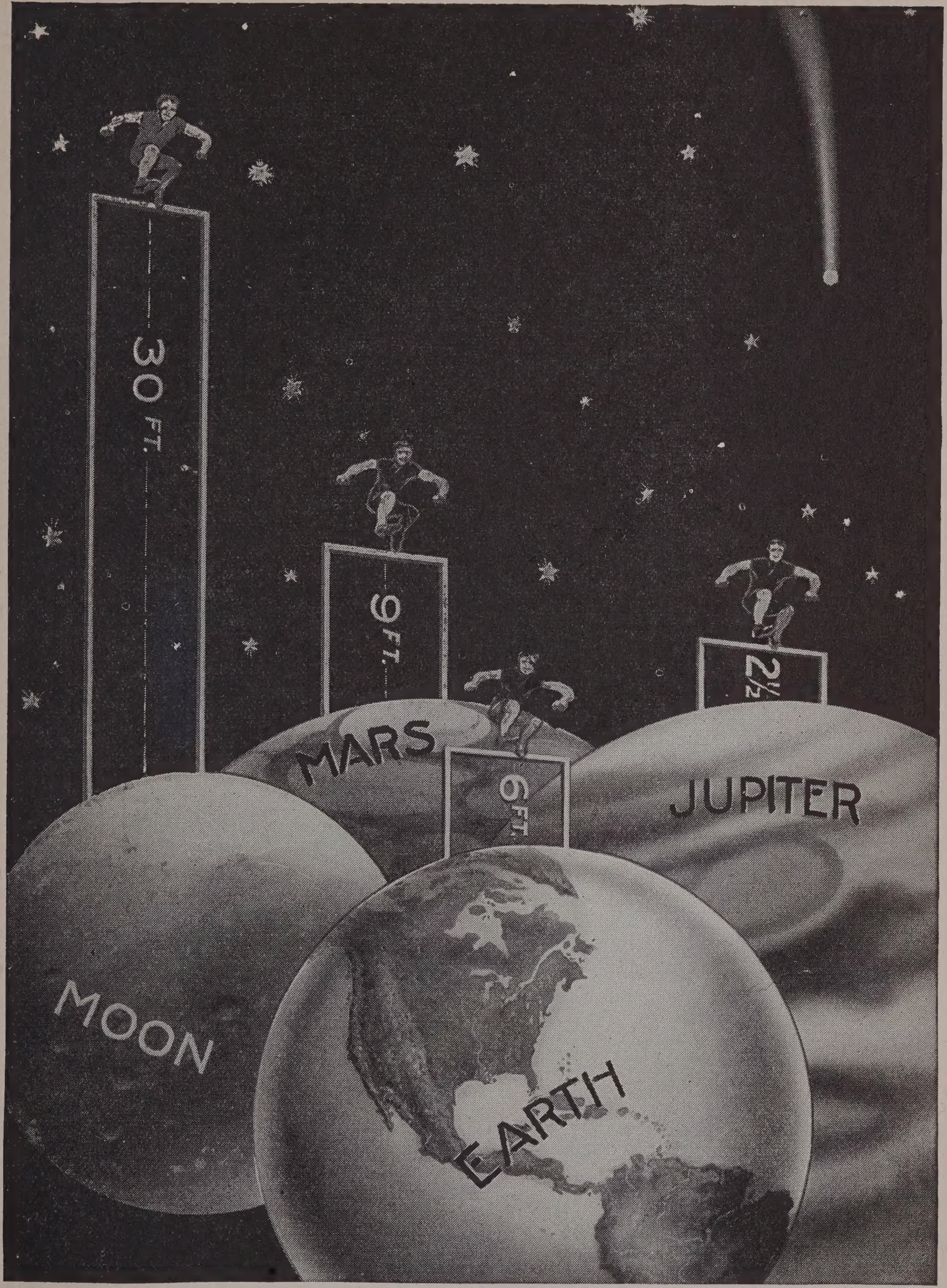
Astrakhan (*ăs-trȧ-kăn'*), an important city and capital of the Russian province of that same name, is situated on an island in the Volga River, about fifty miles from the Caspian Sea. It is sixty-eight feet below sea level. The crooked streets are lined with houses constructed chiefly of wood. The only important building in the city is the cathedral. A canal runs through the city, and it is surrounded by orchards and vineyards. Important manufactures are cottons, morocco leather, soap, silk, and the fur made from the pelts of young sheep and called by the name of the city. It exports petroleum, caviar, cotton and sugar. The population numbers 176,530.

Astrakhan was originally the capital of a Tartar State. It was destroyed by Tamerlane in 1395; captured by Ivan IV of Russia in 1554. The Persians ravaged the city in 1719, and cholera devastated it in 1830. In 1919, it was made a naval base by the Russian forces, and bombed by the British.

The province of Astrakhan extends over an area of 91,042 square miles. It is traversed by the Volga River, in the fertile valley of which grain and fruits are cultivated, and sheep, cattle and horses are raised. The remainder of the province is made up of steppes, in which are many salt lakes and salt marshes. The province has important exports of fishery products, chief of which are caviar and isinglass. The population, which comprises Russians, Armenians, Tartars and Persians, numbers 1,427,500.

Astrology (*ăs-trŏl'ō-jĭ*), the pseudo-science by which terrestrial events are foretold by the position and aspect of the stars and their influences upon human affairs. The ancients used the term synonymously with *astronomy.* The word is derived from the Greek *astron,* star, and *logos,* discourse. The history of astrology is lost in antiquity. It is one of the oldest sciences and prevailed among the Chaldeans, Chinese, Egyptians, Etruscans, Greeks, Romans, Hindus and Arabians. Even the Jews and early Christians believed in the power of the stars over the destinies of men. Through them it reached western Europe, and in the fourteenth and fifteenth century chairs of astrology were established in some of the European universities. Bacon, Napier, Kepler were among the scientists who believed to some extent in astrology. Wallenstein, the great general of the Thirty Years' War, be-

THE HIGH JUMP ON THE MOON

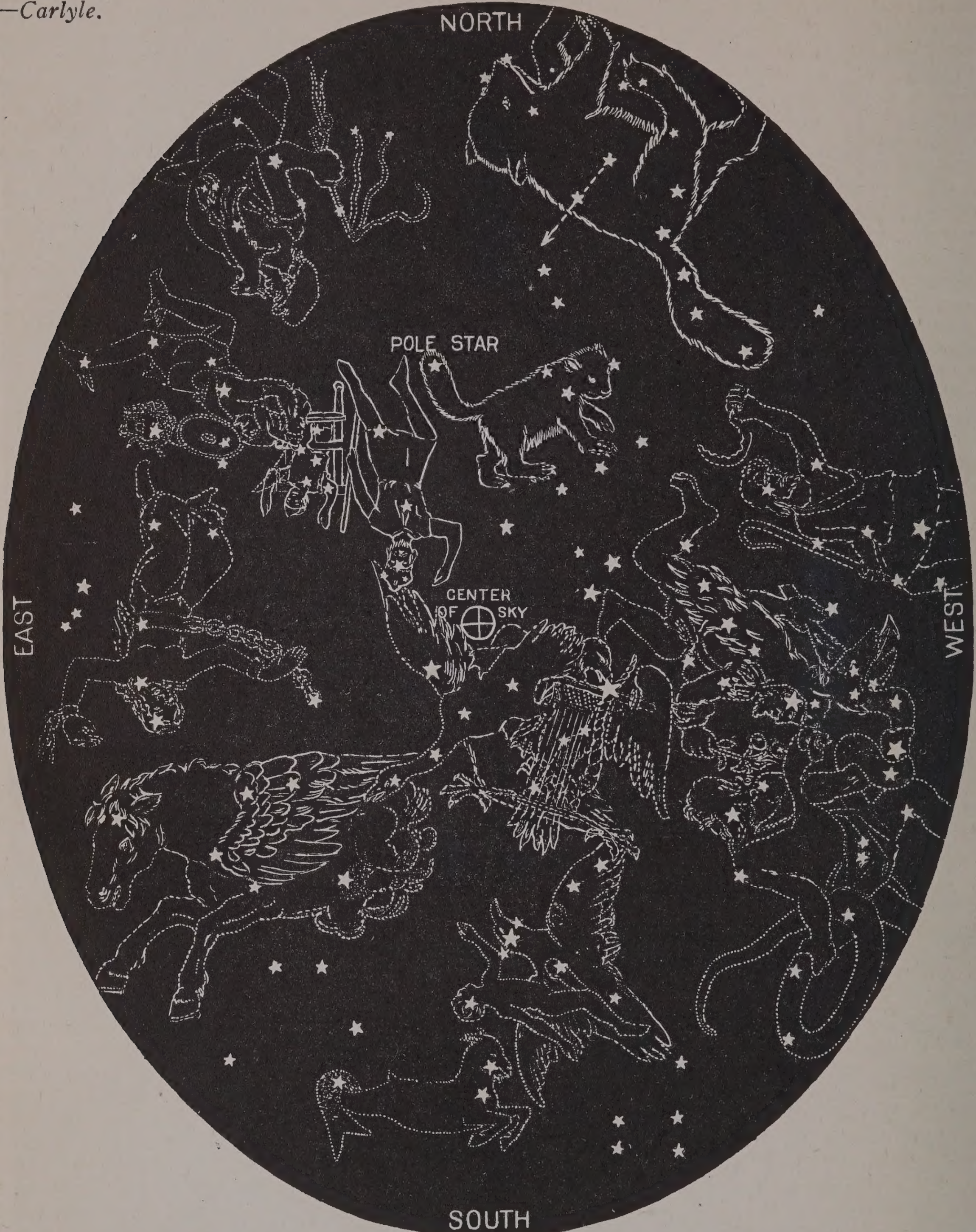


This illustration shows the difference between the pull of gravity on different planets and on the Moon. On the Earth an athlete can jump six feet high, but on Jupiter he could only jump two and one-half feet high, because Jupiter is so much larger and the force of gravity is so much stronger. However, on Mars, which is smaller than the Earth, and the force of gravity considerably less, the same athlete could jump nine feet high, and the Moon is so small that he could jump thirty feet high with the same amount of effort.

OUR NEIGHBORS IN THE SKY

Story of the Constellations

Why did not somebody teach me the constellations and make me at home in the starry heavens which are always overhead and which I do not know to this day?
—*Carlyle.*



On the Great Bear's left, the man with the whip is Auriga, the Charioteer. He is carrying Capella, the Goat, who nursed Baby Jupiter. Perseus, with his shield, carries the head of Medusa of the Snaky Locks and is about to rescue the beautiful Andromeda, who is chained to a rock. In the chair is Cassiopeia, mother of Andromeda, who after Andromeda's rescue was chained to her chair and swung round and round the pole. This constellation is the well-known "W" which you can easily find. By Cassiopeia's feet is her husband, Cepheus, King of Ethiopia. Only the head and forelegs of Pegasus, the Winged Horse, are represented in the sky. The Sea Goat with the fish's tail, is Capricornus. On the right of the picture, Bootes carries his sickle, herdsman's crook. Next is Hercules with his club. Below Hercules is Ophiuchus, the Serpent Bearer. Near the center of the sky is the Swan. Next is the Winged Lyre and below Aquilla, the Eagle, carries Ganymede to Jupiter to be his cup-bearer. It takes nearly ten years for light to travel from Albireo, the star in the swan's head, to the earth, so you will not see this star as it is when you look at it, but as it was ten years previous.

lieved in it implicitly and Napoleon followed his star. The acceptance of the Copernican system of the universe and the advance of science destroyed the power of astrology which bears the same relation to astronomy that alchemy does to chemistry.

The science of astrology was based upon a division of the heavens into twelve regions or spaces, called houses, into which the astrologer divided the skies as he stood looking southward. He discerned six houses in the visible heavens by meridians from pole to pole in order from left to right (east to west). The horizon divided these from the six houses below the invisible heavens. The twelve were called the houses of life, riches, brethren, parents, children, health, marriage, death, religion, dignities, friends and enemies. The house just below the eastern horizon and consequently containing the stars about to rise was said to be the most powerful. Whatever house was ascendant at the hour of birth, therefore, influenced the entire life of the individual. Moreover, each house belonged to a particular planet which had its own character and influence. When this planet was in its own house its power was peculiarly strengthened.

Astrologers were supposed to understand all these influences and be able to interpret them according to fixed rules so that they could cast horoscopes or detailed predictions of events in the lives of individuals. By knowing the date and hour of birth they could determine paramount influences in life. Astrologers were very important persons from ancient times until comparatively modern times. They were given large fees and costly gifts for their services.

See ASTRONOMY.

Astronomy, the science which treats of the heavenly bodies, of their magnitudes, motions, and distances. Astronomy treats of the earth only as a planet revolving about the sun, and of its relations to celestial bodies. It is the oldest of sciences and was employed in remote ages to formulate calendars, and predictions of eclipses and other astronomical events. The term then used to designate this science was astrology. There is a certain sense in which the history of each science extends back into the early periods of antiquity, and even into the prehistoric past. But in this respect astronomy has a history which is unparalleled, except possibly by that of mathematics and of medicine for the earliest men were astronomical observers. The seasons could not be determined, the sea could not be navigated, and geography could not be written without considerable knowledge of the stars and their motions. The result is that astronomy was in a very advanced state as early as the time of Thales (640-546 B. C.), and more than a century before the Christian era it was an astonishingly complete and well-systematized science, a result mainly due to the observations of Hipparchus and to the systematic treatment of Claudius Ptolemy. The Babylonians and Chaldeans had some knowledge of astronomy. The earliest records of astronomical observations were discovered by Callisthenes in Babylon, inscribed on tablets of baked clay and bearing the date of 2234 B.C. It was to the Greeks, however, that one must look for the history and development of astronomy into a science. It was Thales (640-546 B.C.) who propounded the theory of the earth's roundness, and revealed the Lesser Bear to his fellow Greeks. His successors, Anaximander and Anaxagoras, were fathers of the belief that the earth revolved about its own axis and that the light of the moon was reflected from the sun. The theory that the sun is the center of the planetary system and that the earth revovles about it was first promulgated by Pythagoras (582-500 B.C.) a scientist who greatly influenced astronomical annals. With the development of the Alexandrian school attempts were made to determine the distance of the earth from the sun. Correct ascensions and declinations were first used by Hipparchus (190-120 B.C.), who catalogued more than one thousand stars. Many of his theories were enlarged upon by Ptolemy (130-150 A.D.), the founder of the Ptolemaic system. Ptolemy based his system upon the belief that the earth is the center of the universe and that the celestial bodies revolve around it in circles.

At this period the Greeks were familiar with the uniform motion of the fixed stars, and the variable motion of the planets; they knew how to measure latitude and longitude and how to compute eclipses; they had not only determined the fact of the precession of the equinoxes, but had obtained its value with great precision. Meanwhile, Hipparchus had completed a catalogue giving the positions of no less than 1,088 stars.

In 762 A.D. astronomical observations were begun in Arabia. The most noted astronomer in the Arabian school was Al Batani (880 A.D.). Other well-known observers were Ibn-Yunis, and Abul Wefu.

The modern science of astronomy dates from the replacement of the Ptolemaic system by the Copernican system. Copernicus (1473-1543) based his system upon the belief that the sun was the center of the universe about which all other planets revolve. Another system was developed by Tycho Brahe (1546-1601) under which the sun was believed to be moving around the earth while all other planets revolved about the sun. Brahe also engaged in other astronomical discoveries and cometary investigations which greatly aided Kepler (1571-1630) in the discovery of the famous Kepler laws.

It was Galileo (1564-1642), an Italian astronomer who invented the first telescope and applied it to the investigation of the heavens. It was to Galileo also that astronomers learned of the four satellites of Jupiter, the ring of Saturn, and the spots on the sun.

The seventeenth century was the age of Isaac Newton (1642-1727), discoverer of the law of gravitation, whose discoveries enabled scientists to make more accurate observations. The greatest astronomical observer was Marquis de Laplace, who made countless investigations on the solar system and produced his famous work *Mecanique Celeste.* The work thus far through the centuries had been in theoretical astronomy, although the science of physical astronomy had made great strides in development.

The invention of the telescope about the beginning of the seventeenth century gave a tremendous impulse to astronomical discovery. Galileo, Huygens, Newton and many others shortly made and used their own instruments. The continuous improvement in the telescope has been accompanied by a continuous extension of the solar system from that date up to the discovery of the fifth satellite of Jupiter by Barnard in 1892. Advances in our knowledge of the stellar systems lying beyond our own have been made *pari passu* with the improvement of the telescope. Of the more than 1,300 double stars recently discovered by Burnham, practically none could have been seen as double by any telescope in existence at the beginning of the nineteenth century.

One of the most daring and exacting astronomical ventures of the age has been undertaken by the California Institute of Technology assisted by the Carnegie Institute of Washington. Since 1924 plans have been under consideration for the construction of the world's largest "eye," a 200-inch telescope, which, when completed will weigh twenty tons and will reveal objects one billion light years distant. In March, 1934, the first step in this venture was put under way.

After two years of experimentation a glass was perfected at the Corning Glass Works in New York suitable for the mirror of the giant telescope. This superior sort of pyrex glass, known as boro-silicate glass, has an expansion only one-fourth that of common window glass. At the Corning Glass Works the molten glass solution was removed from a huge furnace at a temperature of 1,500 degrees Centigrade. It was poured into a massive mold at a temperature of 1,000 degrees, a process which required ten hours. In this mold it will be allowed to cool to a temperature below 500 degrees. The cooling process will take place in an electric annealing oven, and will extend over a period of about ten months. When sufficiently cooled it will be transported to Pasadena, California, in a special railway car.

The astrophysicist, Dr. John A. Anderson, is technical director of the project. The instrument will be assembled at the California Institute of Technology under the supervision of Dr. Robert A. Millikan. Scientists assert that the instrument will not be ready for mounting for about five years. The mirror must be shaped, ground, polished and silvered before it can be mounted. Three years will be required for the grinding process alone since grinding may be accomplished for only a few minutes at a time in order to avoid overheating the glass in any one area and thus creating a flaw. A massive windowless laboratory has been constructed at the California Institute of Technology. Powerful electric lamps, providing the only illumination in the laboratory, have been insulated to prevent any possible escape of heat into the room. Atmospheric conditions have been controlled as far as possible by engineering devices, and ventilation, temperature and moisture in the room have been subjected to delicate controls.

When completed the telescope will be mounted somewhere in the Pacific Southwest, the exact site not having been decided upon as yet. Dr. Anderson stated that the instrument will be mounted in either Arizona or Southern California. A grant of $6,000,000 was provided by the International Education Board for this venture, which, when placed in operation, will be twice as large as the present world's largest telescope, the 100-inch Mount Wilson Observatory telescope.

A couple of centuries after the time of Copernicus, Richer found that the acceleration of gravity diminishes as one proceeds from the equator to the poles. This made it almost certain that the earth was in rotation. In 1726 Bradley discovered the aberration of light, a phenomenon which could not occur, as it does, unless the earth were revolving about the sun. These phenomena and the law of gravitation, as employed by Newton, practically complete the evidence for the Copernican view; unless we add the discovery by Bessel, in 1838, of the annual parallax of the fixed stars.

Modern astronomy, like most other subjects, has grown into a science of such enormous proportions that it is studied by a great variety of men under a great variety of subdivisions.

BRANCHES OF ASTRONOMY.

Among these branches of astronomy are the following:

1. *General,* sometimes called *descriptive, astronomy,* which includes a general survey of the entire subject, including both the phenomena and the principles of the science.
2. *Mathematical,* sometimes called *theoretical, astronomy,* which assumes the law of gravitation and then proceeds to compute orbits, prepare tables and determine all the motions of the heavenly bodies.
3. *Practical astronomy,* which deals with work in the observatory proper, including a study of various methods and instruments there employed. The fundamental instruments are the clock, the telescope and the divided circle for measuring angles.
4. *Astrophysics,* a comparatively new branch of the science, made possible largely by the discovery and development of the spectroscope. Astrophysics is simply the physics of the heavenly bodies, and has to do with their com-

position, their temperatures, their states of aggregation, their atmospheres, their radiations and even their motions. The fundamental instrument, but by no means the only instrument employed by the astrophysicist is the spectroscope.

In the field of physical astronomy, Sir W. Herschel and his son Sir John Herschel, greatly aided by the development of giant reflecting telescopes and the spectroscope, were enabled to conduct thorough investigations of the chemical constitution and physical condition of the sun, stars and nebulæ. Just as the spectroscope is of an inestimable value in determining the physical composition of the sun and stars, so the telescope has been a great stimulus to the study of astronomy. The first telescopes used formed the image by refraction through a lens. In 1663 and 1669 Gregory and Newton designed instruments which formed the image by reflection rather than refraction. It is again to Sir William Herschel that we must turn for further development of this type of telescope. It was this eminent scientist who developed the telescope until he produced one having a diameter of four feet and a focal length of forty feet. This type of instrument remained in use or sixty years. In 1845 Lord Rosse at Parsontown, Ireland, constructed a six-foot reflector with a focal length of fifty-four feet. Improvement of the telescope in both size and power has been continuous since that date. To-day the largest telescope in the world is the 100-inch telescope of the Mount Wilson Observatory in California. Through the use of this new instrument faint nebulæ, lying at a distance of 300,000,000 light years away have been photographed. Dr. Joel Stebbins, assisted by his co-workers at the University of Wisconsin, recently developed a new type of "thermionic tube" which, when used with other apparatus in connection with the huge telescope at Mount Wilson, permit scientists to study "island universes" lying fifty million light years away from the earth. Six thousand such nebulæ have been discovered by astronomers at this observatory,

SUMMARY OF DISCOVERY.

Passing now to a brief survey of the astronomical discoveries, we may outline the matter as follows:

1. The Sun, which is, to us, the most important of all the heavenly bodies, being the one upon which we are dependent for our daily existence, is simply one of the fixed stars. It appears much larger than any other of these stars simply because it is many thousand times nearer us than the nearest of the stars. See Sun.

2. About the sun as a central body there have been discovered many bodies which are distributed at distances varying from one third to thirty times the distance of the earth from the sun. These bodies reflect the light of the sun and have, to the naked eye, the appearance of stars. Since, however, their apparent position in the sky changes from night to night, they are called planets, which is merely the Greek word for wanderers. Besides the earth, which is one of these planets, there are seven others of importance, and besides these eight there is a large number of similar bodies, much smaller in size, called asteroids.

3. Now and then the solar system entertains visitors from other parts of the universe. These stray bodies, which come into the solar system for a few days or at most, for a few months, and then leave it again, are called comets, for the reason that they resemble a star with flowing hair. Comets are probably composed largely of hydrocarbon gases, since the spectrum which they exhibit is always that of the Bunsen burner. But what is the source of their light, what is their origin and why their tails are repelled by the sun are still unsolved problems.

4. Leaving the solar system and passing out into space, our nearest neighbor is another great sun (as we learn by the spectroscope), whose distance from the earth is such that more than three years is required for light to travel from it to us. This star, which is called a *Centauri*, is said to be fixed, since from year to year its motion is so small that it can be detected only by very careful and delicate measurements. Most of the stars one sees on any clear night belong to this class. They are all so far away that, however much they may be magnified, they still appear as bright points.

In addition to these, a telescope will reveal a number of double suns, or double stars as they are called, each revolving about the other. Even a small telescope will also reveal many bright objects having the appearance of a small bright cloud or patch of light. Such a body is called a *nebula*, which is merely the Latin word for small cloud. These nebulæ possess the utmost variety of form; have fixed position as fixed stars do; are composed of gases, including hydrogen and probably helium, and, in fact, exhibit nearly every gradation in appearance from a bright cloud to a bright star. Nebulæ probably represent the fixed stars in the earlier stages of their development.

The four groups of bodies just mentioned include practically all that we meet in the universe about us, if we except those small particles which the earth encounters now and then, some of which burn in the earth's atmosphere and are called shooting stars or meteors. Some of these are large enough to penetrate the entire atmosphere and reach the earth's surface, in which case we call them meteoric stones. Certainly some, and possibly many, of the bodies mentioned above are accompanied by other small bodies revolving about them. These bodies are called moons or satellites, and are included as a part of the body about which they revolve.

In an effort to further the progress of astronomy and to present to the public in general a fuller understanding of celestial bodies, planetaria have been erected throughout the world. Eighteen planetaria have been erected in Europe and two in America. The first such edifice to be opened to the public in America was the Adler Planetarium of Chicago, which was dedicated on May 10, 1930. It was the gift of Max Adler of Chicago and was erected at a cost of $1,000,000. The edifice is 160 feet in diameter, and is twelve-sided, each side bearing a sign of the zodiac. It is surmounted by a copper dome eighty-five feet in diameter. The technical director of the institution is Dr. Philip Fox, a prominent authority on stellar physics and stellar spectroscopy.

The second planetarium in America was opened on November 1, 1933, in Philadelphia, It forms a part of the astronomical section of the Ben Franklin Memorial and the Franklin Institute. It is the work of the Carl Zeiss optical works in Jena, Germany, and was presented to the Institute by Samuel S. Fels. The dome of this institution has a diameter of sixty-five feet.

See Copernicus; Newton, Isaac; Laplace; Kepler; Brahe; Galileo; Ptolemy; Pythagoras; Planet; Zodiac; Eclipse; Star; Sun; Mars; Venus; Meteors; Moon; Equinox; Spectroscope; Telescope.

As You Like It, a comedy of Shakespeare, written probably in 1599 and founded as to its plot upon *Rosalind*, a novel by Thomas Lodge. The first printing of the drama was in 1623 when it appeared in the "First Folio," a collection of Shakespeare's works. In *As You Like It* Shakespeare imagines a sort of golden age, in which an ideal life according to nature is led by the outlawed Duke and his court "under the shade of melancholy boughs" in the forest of Arden. The bright wit and beauty of the dialogue and the combination of romance, philosophy and art in this play, make it one of the most readable of the works of Shakespeare, and still a favorite drama upon the stage. In no other play are grace and thought so exquisitely mingled and touched with humor.

See Shakespeare, William.

Atacama (*ä'tä-kä'mä*) **Desert**, a region in the northern part of Chile extending from Copiapó northward into Antofagasta province. On account of its location, it is not reached by the rain-bearing winds and consequently receives almost no rainfall. The surface is mountainous and sterile, but is rich in minerals, especially copper. In the more elevated parts especially around Carcote and Lake Ascatan, are found rich deposits of salt, borax and nitrate. In the eastern part of the country there is sufficient rainfall to permit the growth of herbage, which is used as fodder for llamas and other animals.

Atahualpa (*ä-tä-wäl'pä*), or **Atabalipa** (*ä-tä-bä'lē-pä*), the last Inca ruler of Peru. He was first given the kingdom of Quito, but in a war with his half-brother, Huascar, had just obtained the rule of Peru, when Pizarro, at the head of his 200 Spanish cavaliers, marched through the country and entered Caxamarca where the Inca was encamped. By a daring but treacherous stratagem Pizarro attacked and imprisoned the king, who had come by invitation on a friendly visit. While a priest was explaining the Christian religion, at a sudden signal the mysterious firearms poured death into the terrified masses of the Peruvians and the Spanish cavalry rode them down with merciless fury. Atahualpa, made a captive, agreed to pay an enormous ransom. He was accused, however, of plotting against Pizarro, tried and condemned to be burned. He agreed to be baptized, and his sentence was modified to death by strangling (1533). Prescott in his *Conquest of Peru* tells the story of this struggle and of the wonderful civilization of the Incas.

See Incas; Peru; Pizarro, Francisco.

Atalanta (*ăt-ȧ-lăn'tȧ*), a heroine in Greek fable. She was an Arcadian, daughter of Iasus and Clymene. At her birth she was left to die on a hill by her father who had wished for a son, but was suckled by a she-bear and grew up to be a maiden huntress of marvelous courage and skill. She slew the centaurs who pursued her, sailed with the Argonauts and took a prominent part in the chase of the Calydonian boar. She was the swiftest of mortals, and having many suitors, offered to marry the one who should outstrip her in a race, the penalty of defeat being death. At length she was beaten by stratagem. Hippomenes got from Venus three golden apples, which he dropped one after another during the race. Atalanta was so charmed by their beauty that she stooped to pick them up and so lost the race. They were both later changed into lions by Venus to draw the chariot of Cybele. Her story has been put into poetic form by Swinburne in his *Atalanta in Calydon.*

Atchafalaya Bayou (*ăch-ȧ-fȧ-lī'ȧ-bī'o͞o*), a river of Louisiana or, more properly, an outlet of the Red River. It flows southward to Grand Lake, passes through it and reaches the Gulf of Mexico by Atchafalaya Bay after a course of 200 miles. Its name means lost river, and it is supposed to have once been the bed of the Red River.

Atchison (*ăch'ĭ-sŭn*), a city and the seat of Atchison County, Kansas is situated on the "Great Bend" of the Missouri River, about fifty miles northwest of Kansas City, Missouri. It is an important railway center, nine distinct lines converging there. Its excellent transportation facilities, both by rail and water, have been of the utmost importance in making Atchison one of the most important commercial cities in the State. Its principal industrial establishments include grain elevators, flour, corn, and oatmeal mills, iron foundries, lumber mills, machine shops, furniture factories, brickyards, and carriage and wagon works.

The city has grown rapidly since 1854 when it was settled by the pro-slavery party. It was named in honor of Senator D. R. Atchison. It was incorporated as a city in 1858. To-day it is the seat of the State Soldiers' Orphans' Home, St. Benedict's College (R.C.), Mount

St. Scholastica's Academy (R.C.), the Midland College (Lutheran), and the Atchison Latin School. There are three parks in the city, Forest, City, and Central. A noteworthy bridge, 1200 feet in length, spans the Missouri River here. In 1930 the population was 13,024.

Athabasca (*ăth-ȧ-băs′kȧ*), the name of a river, lake and former district in Canada. The Athabasca River is the most southerly of the rivers that go to make up the Mackenzie Basin. It has its source in the Rocky Mountains, in Yellow Head Pass high up in perpetual snow. It flows easterly and northerly for a distance of about 765 miles, collecting in its course the waters of the Baptiste, Macleod, Freeman, Pembina, Lesser Slave and other streams. It is one mile wide where it empties into Lake Athabasca (Lake of the Hills). The river ultimately flows out to the Arctic Ocean.

Lake Athabasca lies partly in Alberta and partly in Saskatchewan. It is about 230 miles in length, and its area is 2,842 square miles. Its width ranges from fourteen to thirty-five feet. The single outlet of Lake Athabasca is the Slave River.

Prior to 1905 Athabasca was the name of a division of the Canadian Northwest. In that year this district was divided between the provinces of Alberta and Saskatchewan.

Athaliah (*ăth-ȧ-lī′ȧ*), the daughter of Ahab, king of Israel, and Jezebel. She married Jehoram, king of Judah, and brought the worship of Baal into Judah. (See II Kings xi.) After the death of her son, Ahaziah, who succeeded Jehoram but reigned only one year, she tried to pave her way to the throne by destroying all the members of the royal family. But Ahaziah's son, Joash, was hidden by his aunt, and after Athaliah had reigned six years, the high priest, Jehoiada, placed Joash on the throne and caused Athaliah to be killed. Handel, in an oratorio, has told this story, and Racine also, in his drama *Athalie*, for which Mendelssohn composed the music.

Athena. See MINERVA.

Athens (*ăth′ĕnz*), the capital of Attica and the center of ancient Greek culture and the capital of the Hellenic Republic. The city is beautifully situated. In its center is the rocky height called the Acropolis, rising about 500 feet above the plains of Attica; and grouped around it are the Areopagus or Hill of Mars, the Museum or Hill of the Muses, the Hill of the Pnyx and the Hill of the Nymphs. The river Ilissos can be seen to the north and east, and the Kephissos to the south and west, while the plain is itself girdled by hills

In legend Athens dates back to the hero Cecrops, from whom the city was called Cecropia, as well as the far more famous name, Athens, in honor of its patron goddess, Athena. The mythic King Theseus also plays an honored part in the forming of the early city; while under the hands of Solon and the tyrants Pisistratus and Clisthenes was formed that democratic government which made the city so famous in history, and beginnings were made in the erection of imposing buildings. The ruins of the colossal temple to Zeus, called the Olympium, date back to this period.

During the Persian wars the city was abandoned and burned. After the victories of Salamis and Platæa, however, it was splendidly rebuilt and the Athenians entered upon the most brilliant epoch of their career. The energy of Themistocles secured the building of the walls around the Acropolis, and the city walls, about five miles in circumference, with their ninety-seven towers and ten gates. Just outside one of these gates was the Ceramicus or burying-ground, where are still to be seen beautiful tomb bas-reliefs. The fortification of the harbor, called Piræus, and the building of the famous "long walls," 500 feet apart, some years later, completed the defenses of the city.

The age of Pericles was the most glorious in the history of Athens. Then flourished Monesicles and Ictinus in architecture, Phidias and Myron in sculpture, Æschylus and Sophocles in tragedy, Socrates and Plato in philosophy, Herodotus and Thucydides as historians and Pindar and Simonides as poets. In this period many of the finest buildings of Athens were built—the Parthenon, considered the most beautiful ruin in the world, the Erechtheum, the Temple of Wingless Victory, the Theseum and many other temples and monuments. At that time the city had more than 10,000 dwellings and 100,000 free inhabitants, with at least twice as many slaves.

The close of the Peloponnesian War marked the fall of Athens. Her splendid walls were destroyed and her civic spirit was broken; but a few men such as Demosthenes still kept her the defender of Greek freedom while Lycurgus laid out the Stadium, having a seating capacity of 45,000, for the grounds of the so-called Panathenaic festival. After Athens, with the remainder of Greece had fallen under the power of Macedonia, it became the seat of schools of philosophy and rhetoric, and later, when it became a Roman province (146 B. C.), it for a long time taught its conqueror. During this period the Emperor Hadrian gave the city a new prosperity. From this time onward, however, Athens became the spoil, first of the Romans, then of the Goths, afterward of the Christians and lastly of the Turks. In 1833 Greece was freed from the Turks. Since that date Athens, as the capital first of the Kingdom, and, after 1924, of the Republic, has grown rapidly.

Modern Athens has many schools. The elementary schools are maintained at the expense of the State. There is also a Government Commercial School and a Polytechnic School. The universities of Athens are the National, which was founded in 1836, and the Capodistria. In 1932 these universities maintained a faculty of 122 professors and had an enrollment of 6,195 students. The Metropolitan of Athens is president of the Holy Synod of the Greek Orthodox Church, which includes, besides himself, eight bishops, who must live in Athens during their year of office. The Synod is a permanent council.

Within recent years there has grown up in Athens a great interest in the study of the remains of antiquity. In the early nineteenth century much of the finest sculpture was taken from the Acropolis and is now preserved in the British Museum. An Archæological Council, under the direction of the Ministry of Education, is in charge of the Service of Antiquities, which is responsible for the safeguarding and restoration (where possible) of all antiquities. In 1928 American engineers restored the aqueduct built 2,000 years ago in the reign of Emperor Hadrian.

In 1928 Athens had a population of 452,919.

See Greece; Æschylus; Attica; Demosthenes; Draco; Ecclesia; Herodotus; Macedonia; Parthenon; Pericles; Piræus; Plato; Socrates; Solon; Sophocles; Theatres; Thucydides.

Athens, a city and the seat of Limestone County, Alabama, is situated 100 miles north of Birmingham. It has a cotton mill, planing mill, ice plant, and its own water works and electric light plant. It is the seat of the Athens Female College (Methodist Episcopal South), opened in 1843; also of the Trinity College for Negroes, and a State Agricultural School. On September 23, 1864, Colonel Campbell surrendered here with 600 Federal troops to General Forrest, at the head of a large force of Confederate cavalry. In 1930 the population was 4,238.

Athens, the capital of Clarke County, Georgia, is situated on the Oconee River about seventy-three miles northeast of Atlanta. It is a center of the Georgia cotton-trade, and has a number of cotton-mills and other manufactories. It is the seat of the University of Georgia, the State College of Agriculture, the State Normal and of Lucy Cobb Institute. The city is an important railway junction, and fifty miles to the eastward it has the facilities of the Savannah River. In 1930 the population was 18,192.

Athens, the seat of Athens County, Ohio, is situated on the Hocking River, seventy-five miles southwest of Columbus. Manufacture of furniture and parquetry flooring is an important industry. Coal mines and ancient Indian mounds are found in the vicinity. Athens is the seat of Ohio State University. In 1930 the population was 7,252.

Atherton (*ăth'er-tŭn*), **Gertrude Franklin,** an American novelist, was born in San Francisco, California, on October 30, 1857, the daughter of Thomas Lyman and Gertrude (Franklin) Horn. She was educated by her grandfather, Stephen Franklin, who had the finest private library in the state of California. He was determined that his grand-daughter should be well-read, and towards the realization of that ideal, obtained for her the finest of private teachers. She attended St. Mary's Hall, Benicia, California, and Sayre Institute, Lexington, Kentucky. At an early age, while she was still attending school, she was married to George H. Bowen Atherton of Menlo Park, California. It was but a few years later, in 1887, that she was widowed. After the death of her husband, Gertrude Atherton devoted herself to literary pursuits.

Many of these years were passed abroad where the sources of material for literary work are inexhaustible. Wherever she travelled, Gertrude Atherton made an intensive study of life in the towns about her. In California she was especially interested in the old Spanish missions and settlements which bubbled over with a vast store of treasure that she embodied in several of her novels, particularly, *Rezanov; The Doomswoman,* and *The Splendid Idle Forties.* Her wide travels through Austria, Germany, France, Greece, Italy, and the West Indies enveloped her in a sphere of cosmopolitan interests. In the field of historical fiction her greatest success has been *The Conqueror,* the story which centers around Alexander Hamilton. Her work gives gripping reality to the times and the characters she portrays. She presents vivid scenes accompanied by rapid action. She has produced works with settings in far and distant corners of the earth. In 1925, in which year she visited Monte Carlo, Athens, Corinth, and Mycenæ, she lost interest in the modern setting which she had adopted for her novels. She devoted herself to a study of the ancients and upon her return to California began work upon *The Immortal Marriage,* a story of Aspasia, which was published in 1927. This was followed in 1928 by *The Jealous Gods,* the romance of Alcibiades, and in 1929 by *Dido, Queen of Hearts,* Gertrude Atherton's offering in celebration of the Virgil bimillenium.

Throughout all of her works there is evidence of great versatility, vigor and freshness which have endeared Gertrude Atherton to a world of readers. In 1931 *The Sophisticates* was published, the first modern novel produced by its author since 1925. Among her other important works are: *The Californians* (1898); *Aristocrats* (1901); *Ancestors* (1907); *California — An Intimate History* (1914); *Before the Gringo Came* (1915); *The Avalanche* (1919); *Sleeping Fires* (1922); *Black Oxen* (1923); *The Crystal Cup* (1925); *Vengeful Gods* (1931), and *Adventures of a Novelist* (1932).

Athletics (*ăth-lĕt'iks*), the art of training by athletic exercise or of engaging in games and sports. The indulgence in games and sports is as old as the era of Homer. The Greeks led their world in physical training, distinguishing between the athlete who contended in games for a prize, and the gymnast who trained professional athletes. There were four great national festivals in ancient Greece which were spectacular displays of the athlete's skill. The most famous of these festivals was held at Olympia. At the Olympic games Greek athletes of every social rank, but of pure Greek descent, competed in wrestling, boxing, foot-racing, horse-racing, and chariot-racing. The victor was awarded the prized wild-olive garland. Homer told of these games in the *Iliad*, and Plato, Aristotle, and other ancient philosophers and writers held that athletic training was a necessary part of an education. The Greek cities, especially famous Sparta and Athens, emphasized the importance of athletics in their educational systems and constructed large buildings and set aside large plots of ground for the training of their youth. Rome also advocated athletic training for the development of the fine physique demanded of the citizens. During the Middle Ages thorough athletic training was given to the candidates for knighthood.

Among the nations to-day, Germany has been the most systematic in physical training. Yet the British may be said to be the most athletic of modern people. Beginning with the days of King Hal of England, sports and games were universal. The chief features in these contests and rivalries were archery, running, jumping, leaping, wrestling and boxing matches, together with remarkable records in putting shot and throwing the hammer. At a later day came the school sports at Eton, Harrow, Rugby and Shrewsbury, the athletic contests at Oxford and Cambridge, including sculling matches on the rivers and the Highland games at Bræmar, Inverness and other towns in Scotland. Indeed, the hearty enjoyment of sport may be said to be more apparent in England, Scotland and Wales than anywhere else in the world. Even modern wrestling, with the exception of the Japanese jiu-jitsu, is a British art.

In America, the colonial fondness for wrestling in New England, Kentucky, and elsewhere may be traced directly to the mother country. Although the Puritan tendency was to suppress anything in the nature of pleasure, and consequently sport, since the passing of that influence, America has more and more turned to athletics. Baseball is the national game, and there is no community without its center of interest either in professional athletics of some sort, or in the teams and contestants of some school or college. Athletics has become a science in America, incorporated into our educational systems until it has become not only a necessity, but a great power and force in education and in the community at large. In our modern day athleticism has become almost a craze, with its swimming, skating, bicycling, baseball, football, boxing and cricket matches, croquet, golf and lawn tennis championships and boat and hurdle races. To-day the physiology of bodily exercise is better understood and valued than ever before, and hence comes the methodical training indulged in, its results in the healthful nutrition of the body, its beneficial effects on the respiratory organs and the stimulus to the brain and all the bodily powers.

Those who practise athletics are amateurs, professionals or semi-professionals. All train, that is, make particular preparation for special sports, but amateurs do not compete for money, receive pay for services nor contest against professionals. For many years athletics in America consisted of contests between isolated colleges or clubs. About 1875, however, these institutions began to form groups, train methodically, play series of games and hold large meets. To-day a network of athletic associations covers the civilized world, including even colonies in uncivilized countries, and codes of play regulate every imaginable condition and happening in any game. The United States has an Amateur Athletic Union (A. A. U.), and an Intercollegiate Association of Amateur Athletes.

Training for athletic games has been reduced to a science. It regulates bathing, clothing, diet, exercise and sleep. Exercise is not confined to the practise that the special contest requires, but to whatever tends to develop all-around power and skill.

The Olympic games, which so fascinated contestants and spectators in ancient Greece, were revived in 1896. An international committee met in that year to arrange for the revival of the games. The first festival was held in Athens, and in 1900 a second was held at Paris. In 1904, a third meet was held at St. Louis; in 1920 at Brussels, and in 1924 at Paris. The Ninth Olympiad was held in Amsterdam in 1928, and the Tenth in Los Angeles in 1932. These games have been unusually successful and plans were under way in 1934 for the Eleventh Olympiad which, according to the schedule of the International Olympic Committee, will be held in Berlin, Germany.

See BASEBALL; BASKETBALL; BOWLS AND BOWLING; CROQUET; GAMES; GOLF; HOCKEY; OLYMPIC GAMES; POLO; SKATING; SKI; SNOWSHOES; TENNIS; TRACK EVENTS.

Athor (*ä′thŏr*) or **Hathor**, an Egyptian deity, the goddess of love, mirth and social joy. In Egypt in later years Athor came to be regarded as the goddess of music and the dance. Egyption mythology reveals her, however, as a divinity of the sky, the mother of the sun which rises with the dawn of each new day. At eventide and the setting of the sun, Athor became the goddess of the dead. The belief once prevailed in Egypt that deceased women became Athor upon leaving this world. The original cult of Athor is believed to have been seated in Upper Egypt at Denderah. There the ruins of the temple dedicated to this goddess still stand.

The goddess is most frequently represented in the form of a woman with either a cow's head or ears. The cow was sacred to Athor. In Egyptian architecture the Hathoric Column designates a capital (often four-faced) sculptured with heads or masks representative of this Egyptian deity. Athor was the daughter of Ra, the sun-god. She corresponded to the Greek goddess, Aphrodite.

Ath′os, Mount, called Monte Santo or Holy Hill by the Italians, a famous mountain in Greece, at the extremity of the peninsula of Chalcidice, on the Ægean Sea. It rises to the height of 6,346 feet above the sea. In ancient times several towns were built on the peninsula. Xerxes cut a canal through the isthmus which connects the peninsula with the mainland, to escape the dangerous passage around the promontory; traces of the canal still exist. The peninsula is celebrated as the seat of a kind of monastic republic, consisting of twenty large monasteries besides numerous hermitages and chapels. The entire number of monks is about 6,000. The whole community is governed by four presidents, one of whom is called the First Man of Athos, and a holy synod of twenty members. The monks lead an ascetic life, living on herbs, fruit and fish. They spend their time in farming, gardening, the care of bees and the manufacture of amulets, images, crucifixes and wooden articles of furniture, which they sell.

Atlanta, Ga., the capital of the state and county seat of Fulton County, through which county the Chattahoochee River flows. It lies 170 miles west by north of Augusta and about 295 miles northwest of Savannah, both of the latter cities being on the Savannah River, Atlanta, frequently called the Gate City, is an important railroad and commercial center; it is on the Southern, the Seaboard Air Line, the Atlanta & West Point and other railroads. It occupies high ground, and has a mild, equable climate. The city, which was founded in the year 1837, when for some few years it was known as Marthasville, received its charter as a city in 1847, and in 1878 it became the state capital. During the Civil War it played a prominent part as a rallying point and supply center for the Confederate armies, and as such was for several weeks in 1864 invested and finally captured by the federal army under General Sherman, the city being at the time held by the Confederate General Hood, who was compelled to evacuate it after two sanguinary battles had been fought in the vicinity. Later in the year Sherman withdrew his army and started on his march to the sea, when the city was almost totally burned. After the close of the war Atlanta was speedily rebuilt, and in 1895–96 it was chosen as the site of the Cotton States Industrial Exposition. The new city has been substantially and attractively built and besides its civic and municipal buildings it is adorned with a handsome state capitol, together with a number of important educational institutions, including Atlanta, Oglethorpe, Emory and Clark Universities, State School of Technology, Atlanta Baptist College, two Medical Colleges, the city's training institutes and Georgia Military Academy. It has, moreover, a large and growing number of industrial establishments, including agricultural implement works, machine-shops, foundries, cotton and paper mills, tobacco factories, etc. The city has made progress since the Civil War. Is now one of the busiest and most flourishing cities of the New South and is still enjoying a solid and rapid growth. Population, 225,000.

Atlanta University. A non-sectarian institution founded in 1869 for the education of colored men and women. It is situated in Atlanta, Ga., and in 1910 had 400 students. The president is Horace Bumstead, D. D. The aims of the university are stated to be "to train talented negro youth to disseminate civilization among the untaught masses, and to educate teachers."

Atlantic City, N. J., a popular and fashionable seabathing resort on the New Jersey coast, situated sixty miles southeast of Philadelphia. On account of its salubrious climate it is both a winter and a summer resort. It has an admirable beach, and is frequented both summer and winter by thousands of people from Philadelphia, New York and from all sections of the country. Magnificent express trains, both steam and electric, are run daily between Philadelphia and Atlantic City, while trains are run direct from New York, Pittsburg, Washington and the south. The city is lighted by electricity, the principal streets are asphalted and the electric street car service is of the best the country affords. There are upward of one thousand hotels and boarding houses, some of these being the largest and best equipped on the Atlantic coast.

The Board-walk along the ocean front is over eight miles in length and is sixty feet in width. There are thirteen school buildings, large and convenient churches, numerous halls, magnificent ocean piers and amusement places of all descriptions. The resident population is over 51,000, and the assessed valuation of the resort over ninety-two million dollars.

Atlan′tic Ocean, so called either from Mt. Atlas or from the fabulous island of Atlantis, which separates the old from the new world. Its greatest width is about 5,000 miles; but between Brazil and the African coast the distance is only about 1,600 miles. It is in open communication both with the Arctic Ocean and the Antarctic or Southern Ocean. The average depth is between two and three miles, though in places it is twice that depth. It has been sounded in all directions, and it has been found that as a rule the bed of the ocean is a broad, gently undulating plain, though near some of the continental shores and around some of the volcanic cones which rise from this floor there are very steep slopes. Life exists at all depths of the sea, though becoming less abundant at greater depths; while the surface waters from equator to poles swarm with all kinds of plants and animals, many of which give forth a phosphorescent light, causing what is known as the luminosity of the sea.

Though only about half as large as the Pacific Ocean, the Atlantic is much more important, as the most civilized nations of the world live on its shores and it is the great highway of trade for the world. Its coasts are better surveyed and better provided with lighthouses than those of any other ocean. It is divided by the equator into the North Atlantic and South Atlantic, with respective areas of 14,000,000 and 10,000,000 square miles. It is estimated that the yearly discharge of rivers into the Atlantic is 3,400 cubic miles of water, equal to about one half of the river discharge of the world.

There are warm and cold currents in the Atlantic, which have an effect on the neighboring lands. The most important is the Gulf Stream. It starts from the Gulf of Mexico and spreads out over the ocean to the south of Newfoundland; one part of it returns to the tropics off the coasts of Spain and Africa; the other passes northward between the British Isles and Iceland and on to the coasts of Norway, which are thus rendered habitable, though the opposite coasts of Greenland are icebound.

The chief inlets of the Atlantic are, on the west, Baffin Bay, Davis and Hudson Straits, the Gulf of St. Lawrence, Gulf of Mexico and Caribbean Sea; and on the east the North and Baltic Seas, Bay of Biscay, Strait of Gibraltar and Gulf of Guinea. The principal islands washed by the ocean are, on the west, Newfoundland, Bermuda, Bahama and West India Islands, Trinidad and the Falkland Islands; and on the east, Iceland, Faroe, Shetland, Orkney and the British Islands, the Azores, Madeira, Canary and Cape Verd Islands, together with St. Paul, Ascension and St. Helena. Some twenty cables now cross the Atlantic floor between the Old World and the New; while the Marconi wireless system, now successfully inagurated, adds to the facilities of international communication.

Atlan′tis, in ancient tradition the name of a vast island in the Atlantic Ocean. Plato relates, in his dialogue *Timæus*, how an Egyptian priest told Solon of its existence, lying off the Pillars of Hercules in the ocean and larger than Libya and Asia Minor together. Plato also gives a description of the island and adds a fabulous history. His story is that 9,000 years before his own time Atlantis was a powerful and populous island, and conquered the western part of Europe and Africa. At one time its whole power was arrayed against the nations bordering on the Mediterranean, and every nation gave way before it except the Athenians, who were finally victorious. The gods at last came to the rescue of the earth and an earthquake caused the island to sink in the ocean. Many efforts have been made to find the seat of this island, but it doubtless was only an imaginary land, like the Land of the Dead among the Celtic race.

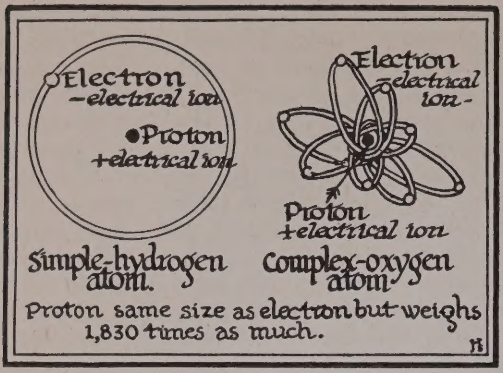
At′las, in Greek fable, the son of a Titan and father of the Pleiades and Hyades. As leader of the Titans he tried to storm the heavens, and for this crime was condemned by Zeus to bear the vault of heaven on his head and hands, standing in the neighborhood of the Hesperides at the western end of the earth on the mountains in the northwest of Africa, still called by his name.

Atlas, the great mountain system of northwestern Africa, stretching from Cape Nun in Morocco to Cape Bon in Tunis, a distance of about 1,400 miles. It is a very irregular mass of mountains running in various directions. It reaches its greatest height (about 13,000 feet) 27 miles southeast of the city of Morocco, and in the peaks Bibawan and Tagherain. The heights approach the sea and form the promontories jutting out into the Atlantic. The slopes of the north, west and south are covered with vast forests of pine, oak, cork, white poplar, etc Copper, iron, lead and antimony are found abundantly, but have not yet been mined to any great extent.

Atoll (*ȧ-tŏl′*), the native name commonly applied in the Indian Ocean to a lagoon island, a low, usually circular reef, often composed of coral and the sand and soil washed up by the sea, and upon which a stunted vegetation grows, with an occasional palm tree a variety of shrubs. Many atolls are as much as a hundred miles in circumference, and enclose bodies of water varying from 12 to 50 fathoms; they furnish good temporary harbors, open here and there, by narrow inlets from the sea. In many cases they are inhabited by Malays. See CORAL ISLAND and REEF.

At′om. If you had a microscope more powerful than any ever invented, and looked at a steel bar through it, you would see tiny particles of it moving with the speed of bullets shot from a gun. These particles would be electrons. They would revolve around a central body called a proton, and the electrons and protons together would be called an atom.

The word *atom*, in Greek, means *indivisible*, and was used by people to name the smallest part of any element so far as they were able to divide it. It is so small you



Note that the probable difference between hydrogen atom and oxygen atom is that the hydrogen atom has one electron, the oxygen atom eight electrons.

cannot see it. But the Danish scientist, Bohr, proved that the atom *was* divisible. It is composed of one central body of positively charged electricity called a proton, and one or more planetary bodies of negatively charged electricity called electrons, moving around the proton at a great speed. You may compare the proton to the sun, and the revolving electrons to the earth and planets moving around the sun.

Hydrogen is the simplest element. It consists of one proton with one electron moving around it, at a speed of 101,174 feet a second—36 times faster than a projectile from a gun. The diameters of the electron and proton are about the same, $\frac{1}{6,666,666}$ of an inch; but the central proton weighs 1,830 times as much as the electron. Helium, another element, has two electrons moving around a central proton, lithium three electrons, beryllium four, boron five, carbon six, oxygen eight, fluorine nine, neon ten, and on up to uranium with ninety-two. An electron bears to the size of the whole tiny atom about the same relation as the size of a pinhead to the dome of St. Paul's Cathedral.

Now if all elements—gold, mercury, lead, iron, etc.—are composed of atoms, and if all atoms are composed of a positive proton and one or more negative electrons, why is it that gold is not lead or mercury? What makes gold gold and iron iron? Many scientists believe that the difference lies in the number of electrons swinging about the proton of each atom. For instance, mercury has 80 electrons; gold has 79 electrons. Professor Miethe, in Germany, succeeded in detaching one of the electrons from some gold atoms by bombarding them with electricity. The result was that he made some gold out of what had been mercury.

By means of rays from radium Professor Rutherford, in England, was able to break the nitrogen atom into hydrogen and helium. Nitrogen has been considered an element: we see that some of the so-called elements may be composed of combinations of absolute elements.

See Sir Joseph Thomson's *Corpuscular Theory of Matter* (Scribners), Soddy's *Interpretation of Radium*, Cameron's *Radium and Radioactivity* (Romance of Science Series), Kimball's *Properties of Gases* (Houghton Mifflin Company).

A'treus, according to the Greek legend, the son of Pelops and Hippodamia. By some versions he is accounted the father of Agamemnon and Menelaus, while others say he was their grandfather but that he reared them as sons. The whole story of the house of Atreus is one of bloodshed, the series of crimes beginning with the murder of Chrysippus by his half brothers, Atreus and Thyestes, and ending with the murder of Clytemnestra and her husband by Clytemnestra's son, Orestes. Because of the first murder, Pelops pronounced the curse upon his sons that they and their posterity should perish by means of one another.

At'tar of Roses (from the Arab word for *perfume*), the oil extracted from the petals of the rose. It is prepared from rose-water in Persia, India and other eastern countries by setting it out during the night in large open vessels, and early in the morning skimming off the oil which floats at the top. It is very costly, and is often adulterated with sandalwood and other oils. Half an ounce of the oil can be made from 200,000 well-grown roses, and this amount, when manufactured, is worth about $40. The oil is at first colorless, but later shows a yellow tint. The oil of Adrianople and of Ghazipoor in Hindustan is considered the best. The region about Ghazipoor is one great expanse of roses.

At'tica, one of the divisions of ancient Greece, with Athens as its capital. Its area was about 640 square miles. It is of the shape of a triangle, having its northeast and southwest sides washed by the sea, and joined to the mainland on the north. As early as the time of Solon it was well cultivated, and produced wine and corn. Figs, olives and grapes are still grown, and goats and sheep are raised. Today Attica and Bœotia together form a division or government in the kingdom of Greece, with an area of 2,472 square miles and a population of 341,247.

At'tila, the Scourge of God, born about 406 A. D., was son of the king of the Huns, and in 434 succeeded his uncle as king of countless hordes scattered over the north of Asia and Europe. He was regarded by the Huns with reverence but by the Christians with dread. He is said to have received the title Scourge of God from a hermit in Gaul. His power at one time reached from the Rhine to the frontiers of China. In 447 he laid waste the entire region between the Black Sea and the Mediterranean. All the people, it is related, were either destroyed or forced to follow him against his enemies. The Emperor Theodosius was completely defeated by him, and seventy large cities were destroyed. A few years later, in 451, Attila marched westward against Gaul. There he was met in the valley of the Marne by Theodoric, king of the Visigoths, and by Aëtius, leader of the Romans. After a terrible battle, Attila was completely defeated and barely escaped with his life. The old historians speak of the battle as one of the most bloody the world ever saw, and it was of the greatest importance, because it prevented the inferior races of the east from destroying the beginnings of new civilization in the west. Not less than 252,000 men are said to have been left dead upon the field. Attila resolved to fire his wagons and cast himself into the flames rather than be taken captive, but Aëtius allowed him to retreat without harm.

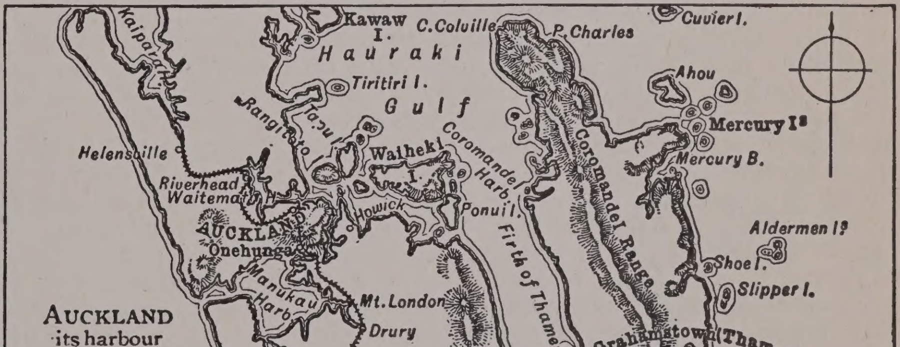
The next year he made a raid into Italy, destroying many cities and driving the people into the mountains. Rome itself was saved only by the bravery of Pope Leo I, who visited Attila and is said to have so awed him by the majesty of his appearance that he gave up his intention of burning the city. He died in 453, while preparing for another attack upon Italy, from the rupture of a blood-vessel on the day of his marriage. His body was put into three coffins, the first of gold, the second of silver and the third of iron, and the men who made his grave were put to death, that no one might know where he was buried. He is described as of very short stature, with large head and flowing hair, small piercing eyes and broad shoulders.

At'tleboro, Mass., an early settled and progressive manufacturing town in Bristol County, on the line of the New York, New Haven & Hartford Railroad, 32 miles southwest of Boston. Originally composed of a group of villages, Attleboro was incorporated as a town in 1694. Today it has a number of bleacheries, dyehouses, smelters, gold and silver refineries and manufactures besides jewelry and jeweler's supplies, silverware, carriages, leather, buttons, cotton goods, etc. It has a well equipped public library, owns its waterworks and is the seat of the Attleboro Sanitarium. See Daggett: *Sketch of the History of Attleboro* (Boston, 1894). Present population 23,000.

Auburn (*au'bûrn*), a city of Cayuga County, New York state. Electricity from Niagara and water-power from Owasco Lake, which is within two and a half miles of the city, supply its factories with power. The city contains a state prison, Theological Seminary and two free libraries. It was long the home of William H. Seward. Manufactures include farm implements, rope, twine, engines and shoes. Population, 40,000.

Auburn, Me., the capital of Androscoggin County, southwestern Maine, on two rivers of the same county name, which furnish the city with splendid water-power. It is situated about 35 miles north of Portland, and has good railroad facilities for the shipping of its special manufactures of cotton and shoes, in which trade it gives employment to some 6,000 hands. Its other industries include last, box and carriage works, machine shops, shoe findings, packing houses, etc. The city is lighted by electricity, and owns its waterworks. It has excellent public schools, at the head of the public school system being the Edward Little High School, a noted institution, a number of churches and fine public buildings. Its population at present is 19,000.

Auck'land, a New Zealand seaport and the chief town in the North Island. For a time it was the capital of England's colony in the South Pacific, before the choice fell upon Wellington in 1865. Auckland has a fine harbor on the Gulf of Hauraki, and possesses considerable trade, being the chief town of its provincial district of the same name. The district has an area of 25,746 square miles, with a population (exclusive of Maoris) of 264,520 in 1911, and a fertile soil and delightful climate. The city of Auckland has considerable foreign trade, chiefly with Britain; it is also the seat of a university, and with its suburbs has a population of 102,676.



Audubon (*aw'du-bon*), **John James,** a distinguished American ornithologist, was born in 1780 in Louisiana. He was educated at Paris, his parents being of French origin. After returning to America, he married and went to live on his plantation. He spent his time wandering through the woods, watching the habits of birds. Often he was gone for months entirely alone, in absolutely uninhabited regions. The varieties of birds which he observed he sketched at once.

After about fifteen years of such excursions, he proceeded to Philadelphia with his designs, intending to publish a work on the birds of North America. But while he was gone from the city all his papers were destroyed by rats, and he was obliged to go back to the forests and begin his work again. Four years later he took his new designs to England and in 1830 appeared the first volume of *The Birds of America*, containing 100 plates. In 1839 the work was completed, and at the same time was published a description of American birds to accompany the volume of plates. Audubon published another book in 1846–50 on the quadrupeds of America. He died at New York, January 27, 1851.

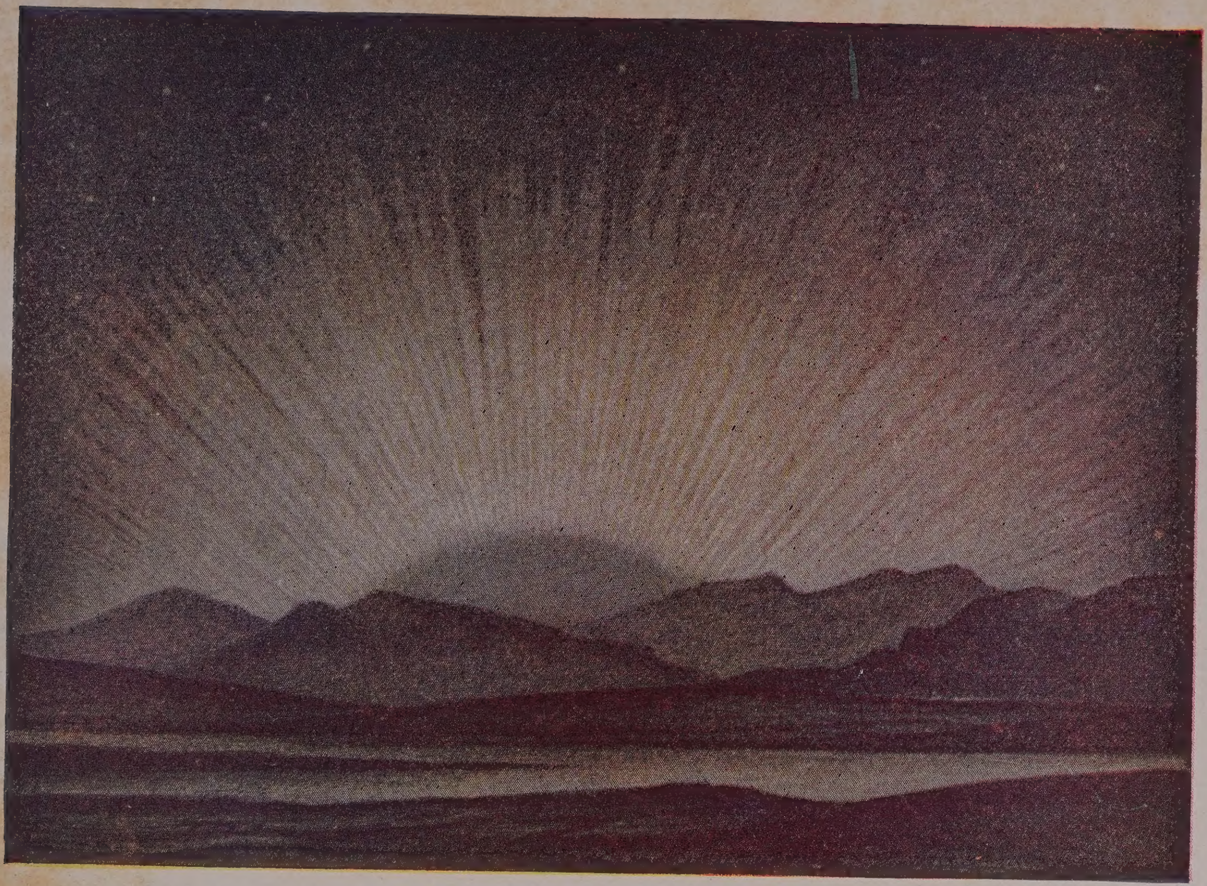
Audubon Societies, organizations formed in over thirty states of the American Union, with about 75,000 members, for the study as well as the protection of bird-life. These societies have waged their battle for birds along many lines and with gratifying results. Through their literature and through the newspaper and magazine press they have awakened a wide interest in behalf of the birds, they have enlightened the public in regard to the æsthetic and economic value of birds; they have enlisted the interest of teachers in the public schools and through them have created in the minds of the young a love of birds and bird-lore; they have secured the enactment of laws forbidding the slaughter of birds and have practically stopped the trade in bird plumage. In cooperation with the federal government they have purchased and set aside as refuges, safe from depredation, many of the islands used as breeding places by various species of sea-fowl along the Atlantic and Gulf coasts and in certain points in Oregon and Washington. A warden is placed in charge of each of these whose business it is to patrol the refuge and see that the birds are protected from trespassers. In order that he may have the prestige and authority of a government officer, the federal government pays him a salary of one dollar a month, but his real salary is paid by the Audubon societies. Pelican Island, in Florida, the first bird reservation, was set aside by proclamation of the president in March, 1903. This island is the only known breeding place for brown pelicans on our Atlantic coast, and the colony had been almost exterminated when the government interfered. Here and in other reservations where many species of wild fowl, including grebes, coots, rail, white ibises, egrets, heron, etc. make their winter homes, these beautiful birds are now rapidly increasing in number. Much similar work is carried on by state organizations. In Louisiana the state Audubon Society controls 750 square miles of land and water on the east side of the Mississippi River near its mouth and a similar tract of territory on the west side. Massachusetts, New Jersey and other states have secured extensive tracts in which wild birds are to be protected. It is probable that ere long similar action will be taken by every state in the Union.

In 1903 the Audubon Societies east and west secured agreements with the Merchants' Millinery Association and the Western Jobbers' Association whereby the sale of the plumage of wild birds was discontinued. It is stated on the authority of the government Bureau of Ornithology that bird life in this country, which during the fifteen years preceding 1903 had been reduced fifty per cent. by the merciless slaughter of birds for their plumage, is now slowly but steadily on the increase, thanks to the vigorous legal measures and the awakening of public sentiment which have resulted from the work of the Audubon Societies.

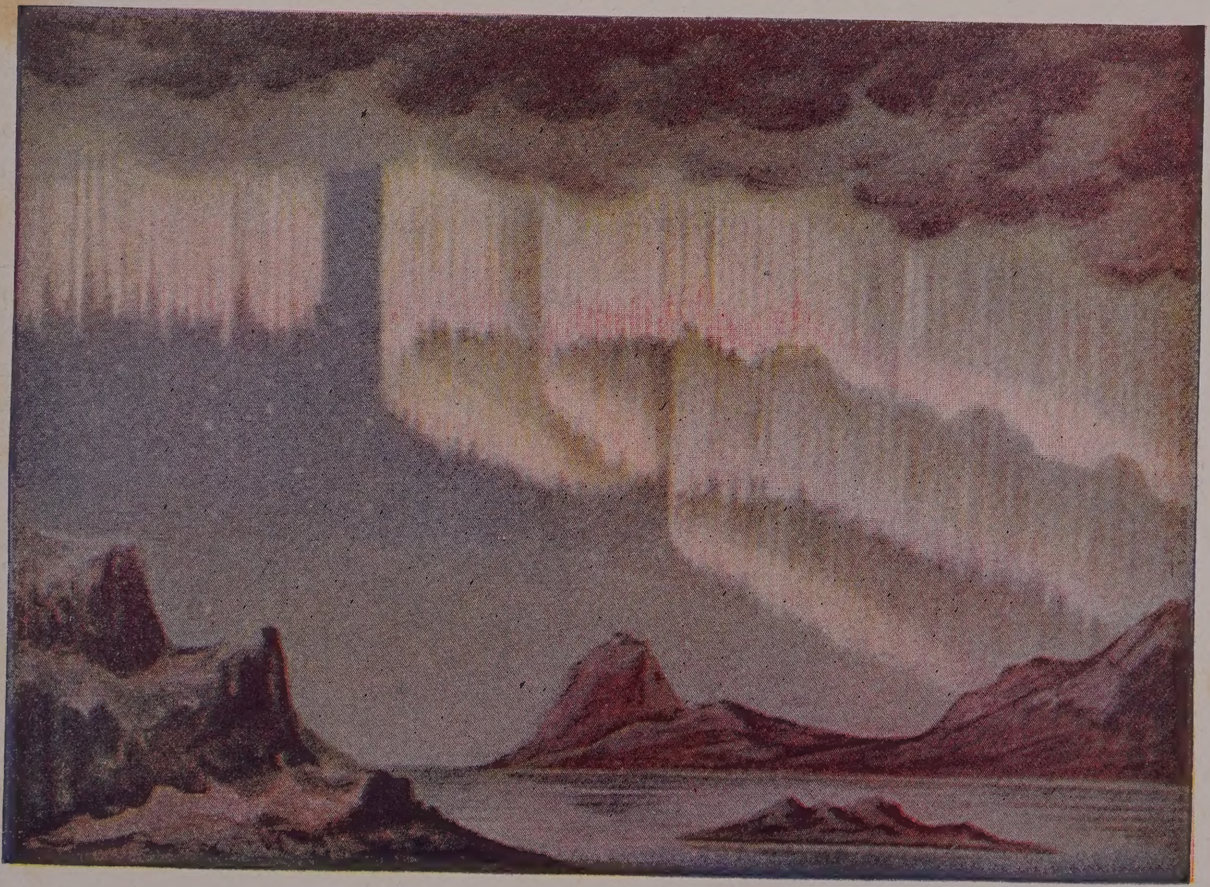
Auerbach, Berthold, German novelist, was born of humble Jewish parents at Nordstetten, in the Black Forest, Germany, February 28, 1812, and died at Cannes, France, February 8, 1882. After passing through the universities and getting into trouble with the authorities for participation in the Burschenschaft, he, under the influence of Spinoza's teaching, renounced Judaism and gave himself to literature. He published a *Life of Spinoza* and one (unacknowledged) on *Frederick the Great*, but made no special success until 1843, when the first of his now famous *Black Forest Village Stories* appeared, followed at some interval by *Little Barefoot*, *Joseph in the Snow*, *Edelweiss*, *The Villa on the Rhine* and by *On the Heights*—the latter two being, with his sketches of the Black Forest, his most representative work. His subsequent work included further novels, *Brigitta*, *Aloys Walfried* and a later series of village stories of the Black Forest, with some admirable delineations of peasant life and character.

Augs'burg, an old and important city of Germany, in Bavaria, is on the River Lech. A colony was planted here in 12 B. C. by the Emperor Augustus. It became a free city of the empire in 1276. Holbein was a native of this city. It has many large manufactories, and is one of the main money markets of Europe. Population, 102,293.

Augur, a Roman soothsayer or diviner who professed to foretell events by the flight of birds or other omens. His office was held in high repute by the heads of the state, who rarely undertook any project of importance without first consultin



AURORA BOREALIS OR NORTHERN LIGHTS



the auguries. The augur among the Romans held his office for life; at one time there were but two (generally patricians); but later their number was increased to nine and even more.

Au'gust, the sixth month in the Roman year, which began with March. It was originally called Sextilis, and received its present name in honor of the Emperor Augustus, because several of the most important events of his life occurred in this month. In this month he was first elected consul and three times entered Rome in triumph; in the same month an end was put to the civil wars. To make it equal to the fifth month, a day was taken from February and added to August.

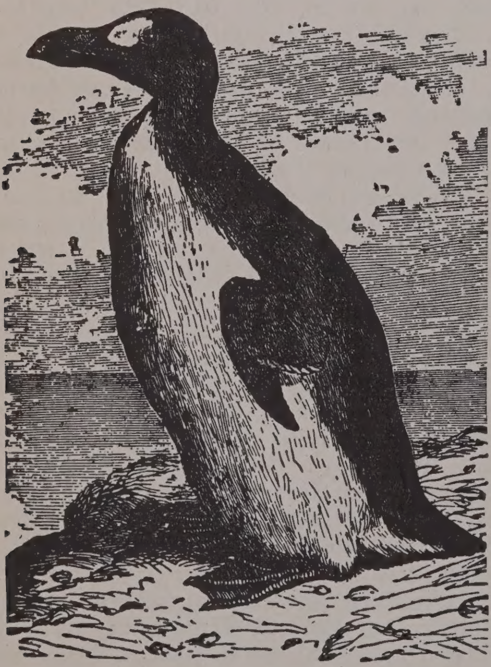
Augus'ta, county seat of Richmond County, Georgia, a city of 55,000. inhabitants, situated at the headwaters of the Savannah River. It was laid out by Oglethorpe, the founder of the state, in 1735 as a trading post for the Indians. It became a point of historic interest and military importance during the Revolutionary War, was visited by Washington in 1792 and by Lafayette in 1825. It is beautifully laid out in wide streets and avenues, noted for their regularity and abundance of shade trees. Greene Street, the main residence street, is 170 feet wide, with a park in the center, the length of the street, shaded with a double row of stately trees. The Augusta canal, nine miles long, developing 14,000 horse power, is one of the widest and deepest in the entire county. It was built and is owned by the city, and furnishes water-power for a dozen large cotton mills. Milling and cotton selling are the main industries of the city. The factory population numbers 15,000. The capital employed is about $6,000,000, running 9,000 looms and 300,000 spindles. Besides these, there are large iron foundries and railroad shops, Augusta is well equipped with hospitals, orphan asylums, electric car lines, parks and public schools. It is a favorite winter resort for northern tourists, having a fine winter hotel, The Bon Air. Its soft climate, beautiful situation and enterprising and hospitable people make it an attractive place for industrial pursuits as well as for social pleasures.

Augusta, the capital of Maine, on the Kennebec River, 43 miles from its mouth. The city lies on both sides of the river, which is spanned by a bridge 520 feet long. The white granite statehouse is one of the finest in New England. Other fine buildings are the courthouse and the Maine insane asylum, to which property has been added the U. S. arsenal grounds. The United States arsenal is on the east side of the river, and the national military asylum is just outside the city limits. A dam, 1,000 feet long, above the city supplies an immense water-power. The chief interest is lumber, but the city has cotton mills, pulp and paper mills and large publishing houses. Because of Augusta's position among the hills of the Kennebec and her lakes and ponds it has become quite a summer resort. Population, 16,000.

Augustine (*aw'gus-tĭn*), **Saint Aurelius,** a famous preacher and scholar, was born at Tagaste, near Carthage, Africa, November 13, 354 A. D. He had the best of schooling, the latter part of it at Carthage, where he fell into bad habits. A passage of Cicero, which he chanced to read one day, first stirred his deeper being into life. For the next ten years he was an earnest student of philosophy. In 383 he went to Milan Italy, as a teacher of rhetoric. Here he became a close friend of the eloquent preacher, Ambrose, then bishop of Milan. Augustine often went to hear his friend preach. His mother, Monica, was an earnest Christian, and her influence and that of his friend brought him to accept Christianity. In 396 he was made bishop of Hippo in North Africa. The next year he brought out his *Confessions*, some passages of which for beauty can only be compared with the *Psalms* of David. His most powerful work is his *City of God*. A great thinker and writer, no man's influence on the church has been greater. He died in 430 A. D.

Augus'tus, Gaius Julius Cæsar Octavianus, the son of Octavius and Atia (the niece of Julius Cæsar), was born September 23, 63 B. C. In early youth he was adopted by Julius Cæsar as his son and heir. At the time of Cæsar's assassination, Augustus was a student under the celebrated orator Apollodorus in Illyricum. He returned to Italy, assuming the name Julius Cæsar Octavianus, and on his landing at Brundusium was welcomed by deputies from the veterans there assembled. Augustus was at first haughtily treated by the consul, Mark Antony, who refused to surrender the property of Cæsar. After some fighting, in which Antony was defeated and had to flee across the Alps, Augustus, who had made himself a favorite with the people and the army, succeeded in getting the will of Cæsar carried out. When Antony returned from Gaul with Lepidus, Augustus joined them in establshing a triumvirate. He obtained Africa, Sardinia and Sicily. Antony obtained Gaul, and Lepidus Spain. Their power was soon made absolute by the massacre of those unfriendly to them in Italy and by victories over the republican armies in Macedonia under Brutus and Cassius. After the battle of Philippi, won by Augustus and Antony, the triumvirs made a new division of the provinces—Augustus obtaining Italy and Lepidus Africa. Shortly afterward, the claims of Lepidus and Sextus Pompeius having been settled by force and fraud, the Roman world was divided between Augustus and Antony. While Antony was lost in luxurious dissipation at the court of Cleopatra, Augustus was striving to damage his rival in public estimation. At length war was declared against the queen of Egypt, and at the naval battle of Actium, B. C. 31, Augustus was victorious and became sole ruler of the Roman world. Soon after, Antony and Cleopatra ended their lives by suicide. The subsequent measures of Augustus were mild and prudent. He abolished the laws of the triumvirate, adorned the city of Rome and reformed many abuses. The title of *Augustus*, meaning consecrated, was conferred upon him as consul. In 12 B. C., on the death of Lepidus, he had the title of Pontifex Maximus or high priest conferred upon him. He died August 19, A. D. 14. He so beautified Rome that it was said: "Augustus found the city built of brick, and left it built of marble." He encouraged agriculture and patronized the arts and literature. Horace, Vergil and all the most celebrated contemporary Latin scholars and poets were his friends. His was the famous *Augustan Age* of Latin literature.

Auk, the name applied to a family of webfooted sea-birds. They have a thickset, heavy body with short wings and tail. They are seldom more than a foot long, dark colored above and white beneath. They live almost exclusively in the water and visit the land only to lay eggs and breed. Their movements on land are very awkward, which is caused because their legs are set far back. They are fine swimmers and divers, using their wings as well as their legs when under water. The razor-bill and the so-called little auk are common in high northern latitudes, and are used by the Esquimaux for food, while the skins are used in making clothing.



GREAT AUK

The most noted as well as the largest member of the family, is the great auk, which has become extinct by the hand of man within the last fifty years. This bird, about the size of a goose, was formerly abundant on both shores of the Atlantic in north temperate parts, not, as is commonly supposed, in the Arctic Ocean. The wings were so short as to be useless for flight, and the birds stupidly allowed themselves to be knocked over by seamen armed with short clubs and to be driven in large flocks on board vessels. They were used as food from the time of the discovery of Newfoundland, and later they were killed for their feathers. While once wonderfully abundant, they have become extinct, because they were ruthlessly slaughtered. Now their skins, bones and eggs bring high prices from museums and collectors.

Auld Lang Syne, a well-known popular song; words by Robert Burns; music derived from a book of Scottish tunes printed in the latter half of the eighteenth century.

Auld Robin Gray, a popular Scottish ballad, written about the year 1772, by Lady Anne Barnard, daughter of the Earl of Balcarras, whose family name was Lindsay. It was originally sung to an old Scotch tune, known as *The Bridegroom Grat*, but has been superseded by a modern air. A second part of the ballad, it is said, was written by Lady Anne, in which Robin Gray dies and Jeanie happily marries Jamie, who "lo'ed her weel," as the song portrays.

Aumale (*dō'māl'*) (Henri Eugène Philippe Louis d'Orléans), **Duc d',** fourth son of Louis Philippe of France and a general of note in the French army, was born in Paris, January 16, 1822, and died in Sicily, May 7, 1897. When a youth he took part in campaigns in Algeria, of which he became governor-general. When the Revolution of 1848 broke out, he resigned his post and joined his exiled father and the Orleanist princes in England, until the law banishing royalty was repealed in 1871. The duke then returned to France, was made a general, and president of the council of war in which capacity he tried and condemned Marshal Bazaine. Later on, a new expulsion bill passed the French legislature in 1886, and he was banished until the revocation of the measure in 1889. Meanwhile, and in spite of the decree of banishment, the Duc d' Aumale bequeathed his beautiful chateau of Chantilly, with its fine art treasures, to the French nation.

Aure'lian, Lucius Domitius Aurelianus, emperor of Rome, was born in

Pannonia early in the 3d century. He came from the lowest classes, but so distinguished himself in the Roman legion which he entered, that he was rapidly promoted. In the campaigns against the Goths by Valerian and by Claudius II, he became very popular with the soldiers, and when Claudius died he was proclaimed emperor in 270 by the army of the Danube, which he then commanded. Having driven the Goths beyond the Danube and defeated many German tribes, he built a long wall to protect Rome against them. One of his best-known expeditions was against Palmyra, a city ruled by the famous Queen Zenobia. He captured the city and treated the people with unexpected kindness, and refused to put Zenobia to death. After his departure, the Roman garrison which he left to guard the city was murdered by the citizens. Upon hearing of this, Aurelian returned, destroyed the city and put the inhabitants to death. Zenobia herself was carried to Rome. Aurelian then defeated an uprising of the Egyptians, and once more obtained for Rome the complete control over Gaul. He also made many improvements in the condition of the people and in the city of Rome, as well as in the discipline of the army, and was given the title of Restorer of the Empire by the senate. While on his way to attack the Persians, he was assassinated near Byzantium in 275 A. D.

Aure'lius Antoni'nus, Marcus, the noblest and, in personal qualities, the most attractive of the Roman emperors, was born at Rome, 121 A. D. His original name was Marcus Annius Verus. Both his father, Annius Verus, and his mother, Domitia Camilla, were of noble blood. On the death of his father, Marcus was adopted by his grandfather, who bestowed the greatest possible care on his education. When a child he attracted the interest of the emperor, Hadrian, who, when he named Antoninus Pius as his successor, stipulated that the latter in turn should adopt both Marcus, who was his nephew, and Lucius C. Commodus. In Antoninus, who was a wise and prudent ruler and a thoroughly good man, Marcus had the best of guardians. In appreciation of the advantages of his youth Marcus himself says: "To the gods I am indebted for having good grandfathers, good parents, a good sister, good teachers, good associates, nearly everything good." While he first studied rhetoric and poetry, he early abandoned these for the study of philosophy and law, having become fascinated with the Stoic philosophy as taught by Diognetus. It was from his stoic teachers that he learned so many valuable lessons—to work hard, to deny himself, to avoid listening to slander, to endure misfortunes, never to deviate from his purpose, to be delicate in correcting others. Through all his stoical training Aurelius preserved the natural sweetness of his nature and became the most lovable and saintliest of pagans. In the year 140 A. D. he was made consul, and from this period on to the death of Antoninus, in 161 A. D., he discharged the duties of his various offices with the greatest fidelity. Antoninus in his last moments left the succession to Aurelius, without naming Commodus; but Aurelius voluntarily shared the throne with the latter, who henceforth bore the name of Lucius Verus, and Rome for the first time was governed by two emperors. Before the close of 161 A. D. the Parthian War broke out and Lucius was sent to quell the insurrection; but he gave himself up to licentious pleasures and intrusted the army to Cassius, who proved an able general, and gained several victories. The empire was now beset by many dangers. A revolt broke out in the German provinces; in Rome a pestilence raged; floods and earthquakes had laid large portions of the city in ruins; and these calamities increased the terror in which the people held their savage enemies. To allay the public alarm Aurelius placed himself at the head of the Roman legions and marched against the barbarians. He conquered the rebellious tribes and made them sue for peace in 168 A. D. Lucius died in the following year. In 170 A. D. the barbarous tribes again revolted, and from this time the contest continued almost through the whole life of the emperor. Though fond of peace, he was brave and relentless in suppressing rebellion. The most famous of all his victories was the one gained over the Quadi in 174 A. D. The effect was to bring the Germanic tribes from all quarters to sue for peace. Aurelius was now called to the east, where Cassius, the governor, had rebelled and seized the whole of Asia Minor; but before he reached there he learned that Cassius had been killed. On his arrival he burned the papers of Cassius without reading them, so that he might not learn who had been guilty of treason, treated the provinces which had rebelled with great kindness, and freely forgave the nobles who had favored Cassius. On his way home he visited Egypt and Greece, everywhere showing a deep interest in the welfare of his vast empire and securing the warm regard of his subjects, who were astonished at his lenity and goodness. He reached Rome in 176 A. D. The next year he went to Germany, where the tribes had again revolted. He again was victorious in several bloody battles, but, worn out with anxiety and fatigue, he died March 17, 180 A. D. The one blot on the character of Marcus Aurelius was his persecution of the Christians, who had been misrepresented to him and whom he regarded as enemies of the empire. His *Meditations* have been translated into English, German, French and Spanish. Several books have been written on his life and character. The best estimate of him is found in Dean Farrar's *Seekers After God.* Compare, also, Pater's *Marius the Epicurean.*

Aurora (in Greek *Eos*), the goddess of the morning. She was the daughter of Hyperion and mother of the winds. She loved Tithonus, for whom she obtained from the gods immortality but forgot to ask for perpetual youth. She lived with him at the end of the earth, and when he grew old, nursed him until at last his voice disappeared and his body became shriveled, when she changed him into a cricket. Aurora is sometimes represented in a saffron-colored robe, with a wand or a torch in her hand, emerging from a golden palace and ascending her chariot; and sometimes in a flowing veil, which she is in the act of throwing back, thus opening as it were, the gates of the morning.

Auro'ra, a city in Kane County, Illinois, on the Fox River about 40 miles from Chicago. It has a variety of manufactures, including machinery, paints, carriages, sash and blinds, silverware, cotton mills, a wheel scraper manufactory, hardware specialties, foundries, etc. The extensive shops of the Chicago, Burlington and Quincy railroad are located here. The public schools are of high grade, and it is the seat of Jennings Seminary. Aurora has 38 churches, a Carnegie Library and all the adjuncts of an up-to-date and prosperous town, and is served by four railroads. Population, 40,000.

Aurora, Mo., a city of Lawrence County, on the Missouri Pacific, Iron Mountain and the St. Louis & San Francisco railroad systems, about 270 miles southwest of St. Louis. Agriculture, fruit-growing and considerable lead and zinc mining are the chief industries of the region. Besides the shipment of these products, the city numbers among its industries flour mills, foundry and machine shops. Population, 5,500.

Aurora Borealis, often called Northern Lights, a luminous phenomenon of remarkable beauty occurring in the high latitudes. In intermediate latitudes the aurora most frequently presents the appearance of long streamers of pale yellowish light extending from the northern part of the horizon well nigh to the zenith. But in the higher latitudes this light appears frequently as an arch or even several arches, with the summits in the magnetic meridian. These streamers and arches are in almost constant motion, appearing to oscillate to and fro or to shoot suddenly upward and then to disappear with equal abruptness.

Since the auroras rotate with the earth, it is practically certain that they are phenomena which occur in the earth's atmosphere. And since they are almost universally accompanied by disturbances of the magnetic needle and by electrical disturbances, it seems highly probable that auroras are produced by electrical discharges, as was first suggested by Franklin. These discharges occur perhaps at a height of from 50 to 100 miles, where the atmospheric pressure does not amount to more than about one one-hundredth of an inch of mercury. Air under these conditions is a fairly good conductor of electricity.

When an aurora is examined with a prism, it presents an emission spectrum which is quite unique, consisting, as it does, of some half-dozen weak lines and one strong green line. This strong line has a wave length of 5,571 tenth-meters and apparently does not coincide with an equally strong line in any known substance. Such a spectrum indicates that auroras are in the condition of a glowing gas. And it is the opinion of two very high authorities, Vogel and Hasselberg, that the spectrum of the aurora is merely a modified spectrum of air, which as yet we have not been able to produce in the laboratory.

Contrary to the general impression, the frequency of auroral displays does not increase from equator to pole, but reaches a maximum at an average latitude of about 60°. So that the northern lights are not seen so frequently in Greenland and in Iceland as in regions south of these countries.

The name *aurora borealis* is due to Gassendi, who observed a brilliant display in France in 1621.

Aurungzebe (*ō-rung-zāb'*), the last great emperor of the Mogul dynasty in India. He was born in 1618, and was early appointed by his father viceroy of the Deccan. Here he gained military experience and at the same time became very rich. In 1657 his father suddenly became sick, and the eldest brother seized the power; but Aurungzebe, uniting with a younger brother, defeated him and soon gained complete control. His father, who had recovered, was made a prisoner for life in his own palace. The reign of Aurungzebe was the most brilliant period in the rule of his race. The first ten years were peaceful, and the emperor showed great wisdom in providing for a famine and in putting down a rising of Hindu fanatics. The rise of the Mahratta empire broke in upon his peaceful régime. The generals sent against this new power were defeated, and Aurungzebe had to march to the Deccan and take the field himself. He remained there twenty-two years, ruling an empire which in wealth and population was probably as great as any ever ruled by a monarch. He died in 1707. He liked to be called *Conqueror of the World;* but to show that he ruled as yet but three quarters of it, he used to tear off a corner from every sheet of paper he used in his correspondence.

Aus'ten, Jane, a famous English novelist, was born in 1775 in Hampshire, England. Her acquaintance with English literature was considerable, and she was an especial favorite with her young friends because of her ability to make up long and interesting stories for their amusement. Her first novel, *Sense and Sensibility*, appeared anonymously in 1811. Others of her works are *Pride and Prejudice Mansfield Park*, *Emma*, *Northanger Abbey* and *Persuasion*. Her works deal entirely with domestic life, and her characters are taken from the English middle class. Miss Austen is especially noted for the delicacy and aptness of her descriptions of character and life. She died in 1817. See Prof. Goldwin Smith's *Life of Jane Austen* in the Great Writers' Series.

Austerlitz (*as'tĕr-lĭts*), a town in Moravia, Austria-Hungary, situated on the Littawa River, is celebrated because of the victory there of Napoleon over the Russians and Austrians, December 2, 1805. After Napoleon had captured Vienna, in the middle of November, 1805, he took up his quarters with about 75,000 men, at Brünn, the capital of Moravia. The Austrian and Russian forces, about 85,000 strong, commanded by their two emperors, were at Olmütz, northeast of Brünn. The French occupied a high piece of ground, partly surrounded by swamps and woods. At about seven in the morning of December 2d, the allied forces advanced against the right wing of the French army, but Napoleon ordered an instant attack on their flank, and completely defeated them after a hard contest. While part of the allies were retreating across a frozen lake, Napoleon's artillery broke the ice and nearly 2,000 men were drowned. At Austerlitz Russia and Austria lost about 30,000 men in killed, wounded and prisoners, while the French loss was about 12,000. After the battle the Peace of Presburg was signed, and the Russian emperor was forced to return to his empire.

Aus'tin, Alfred, English poet-laureate (1896-1913), in succession to Lord Tennyson, was born at Headingley, near Leeds, England, May 30, 1835, and educated at Stonyhurst College and at St. Mary's College, Oscott. In 1853 he took his degree at London University, and was called to the bar of the Inner Temple. In 1861 he first showed his bent toward literature by the publication of some minor poems, followed by the volumes entitled *The Human Tragedy*, *Savonarola*, *The Tower of Babel*, *Prince Lucifer*, *Fortunatus the Pessimist*, *The Garden that I Love*, *In Veronica's Garden*, *Lamia's Winter Quarters*, *England's Darling* and *At the Gate of the Convent*. A collected edition of his poems has appeared in six volumes. He never practiced law but did journalistic work as a newspaper correspondent, and critic, writing largely for the London *Standard* and *Quarterly Review*, and founding and editing for a time, in conjunction with W. J. Courthope, the *National Review*.

Austin, Minn., a city, the county seat of Mower County, on Red Cedar River and on the Chicago, Milwaukee & St. Paul and the Chicago Great Western Railroads, situated about 100 miles south of St. Paul. It is the seat of the Southern Minnesota Normal College and has, besides a Carnegie Public Library, a number of fine churches, schools, city and county buildings and an attractive city park. It is the center of a fertile agricultural region, and has a growing trade, which includes meat-packing products and those of its flour mills, creameries, brick, tile and cement works, besides live stock, wheat, flax, barley, butter and other dairy products, etc. Population 11,000.

Austin, Stephen Fuller, son of Moses Austin, the Texan pioneer, and himself founder of the state of Texas, was born at Austinville, Va., November 3, 1793, and died at Columbia, Texas, December 25, 1836. Taking up the work of his father, who died in 1821, he obtained from the Mexican government a confirmation of the grant to his father; he built up at Austin, Texas, a thriving settlement, while he pacified those Indians that threatened trouble. In the thirties the colony became restive under Mexican rule, and he, siding with the revolutionists, was for a time imprisoned. On being liberated he actively took up arms against the Mexicans, and, calling General Sam Houston to his aid, he committed himself to the project of Texan independence. In 1835 he was a commissioner to the United States to secure the recognition of Texas, but that object was as yet distant, and he died before seeing his cherished designs fulfilled.

Austin, the capital of Texas, stands on the left bank of the Colorado River. The river here breaks through a range of hills upon which the city is built. On Capitol Hill stands the magnificent state capitol, built of Texas marble, at a cost of 3,000,000 acres of state land. From this point broad avenues extend north south, east and west. Austin is an important railroad point, and the market center of a rich agricultural district. It is the seat of the University of Texas, endowed and maintained by legislative grants, with 71 instructors and an attendance of 2,500 students. Here are also located St. Edward's College, St. Mary's Academy, Tillotson College and other academies and seminaries; also the state asylums for the blind, insane, and deaf and dumb. Population, 45,000.

Australa'sia, meaning Southern Asia. includes Australia and the neighboring islands—Tasmania, New Zealand, Papua, New Caledonia, the New Hebrides, New Guinea, New Ireland, New Britain, Tonga, Navigator's and Samoan Islands, the Marquesas, the Society and Fiji Islands. The inhabitants of these islands are for the most part members of the black race. Thus the islands are oftentimes termed "Melanesia," meaning "black islands."

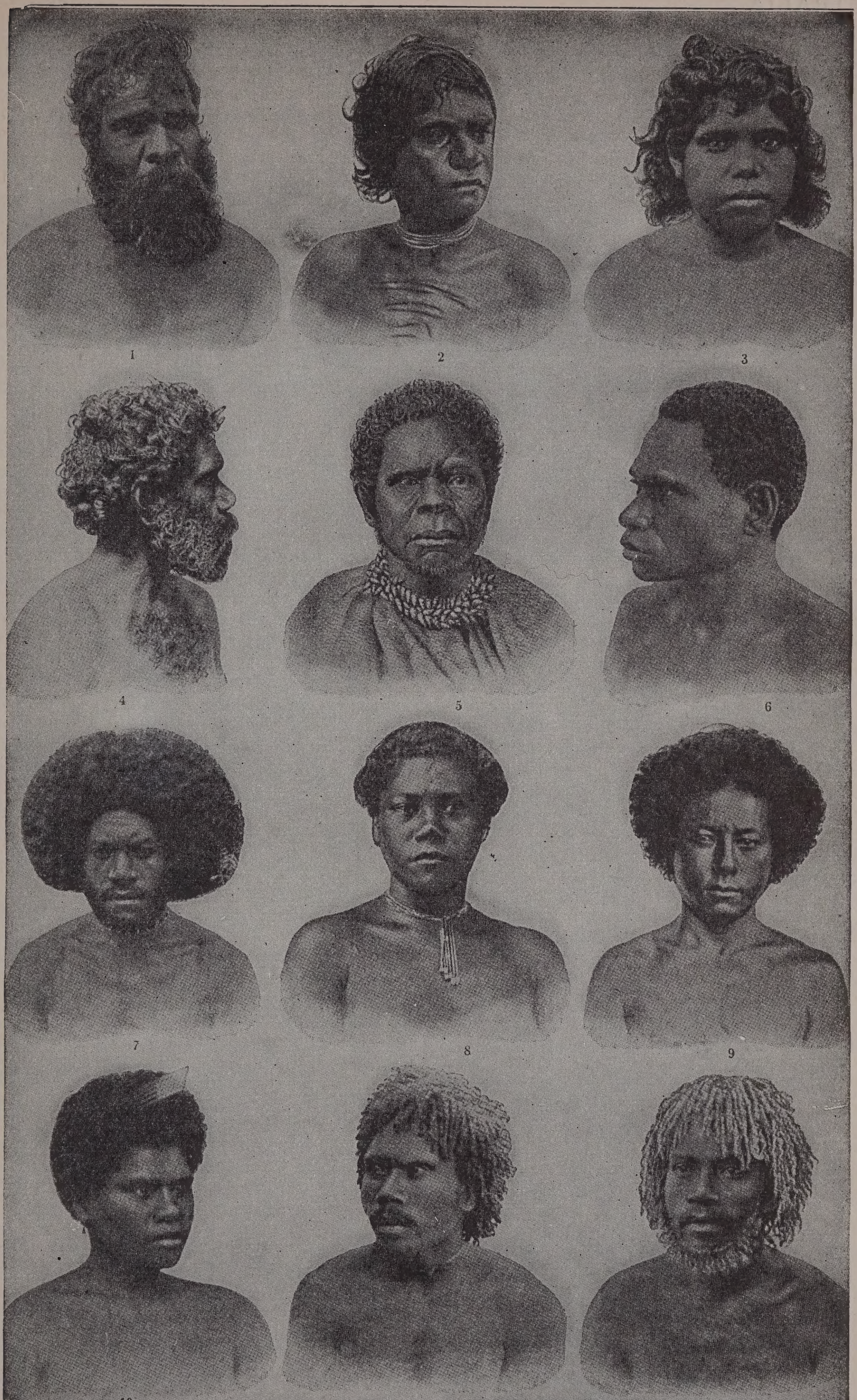
Australia (*ôs trā'lĭ-ȧ*), **The Commonwealth of,** an island continent, is situated in the Southern Hemisphere southeast of Asia. It is bounded on the west by the Indian Ocean, on the east by the Pacific Ocean, and on the north by the Timor, Arafura, and Coral Seas. The greatest length of the continent proper, from east to west, is about 2,400 miles. Its greatest breadth, from north to south, is approximately 1,970 miles. Australia extends over an area of 2,974,518 square miles, 2,948,366 miles of which lie within the continent proper. The Commonwealth is composed of six Original States, former colonies: New South Wales, which covers an area of 309,432 square miles; Victoria, 87,884; Queensland, 670,500; Tasmania, 26,215; and the territories: Northern Territory, 523,620; and the Federal Capital Territory, 940.

Surface and Drainage. Australia's coast line, which extends over about 10,000 miles, is almost unbroken. Parallel with the east coast stretches for 1,200 miles the Great Barrier reef which offers but one safe opening for ships. A large part of the interior is a barren tract of salt or mud plain. The vast plains of the central portion are bordered on the east and west by low mountain ranges. On the eastern coast the mountain range stretches northward from the vicinity of Melbourne, Victoria, to Cape York in the northeast. This great dividing range is generally known as the Australian Alps, although locally these mountains are frequently called the Blue Mountains, the New England Range, the Grampians and the Pyrenees. It is on this range that the imposing Mt. Koscuisko towers upward to an altitude of 7,328 feet, the highest point on the continent. The lowest point is at Lake Eyre in South Australia, which is thirty-nine feet below sea level. From the northern portion of the Northern Territory to northern South Australia are at least fifteen separate mountain ranges stretching from east to west. The most important of these ranges are the Murchison, Wickham, Sea, Musgrave, Newcastle, Townsend, and Ashburton ranges. West Australia has many isolated mountain peaks and fertile valleys. About fifteen mountain ranges extend over Queensland territory, chief among which are the McIlwraith and Normanby in the northeastern portion; the Clancurry, Gregory and McKinley in the northwest; the Selwyn and Kirby in the central west; the Warrego in the south central; the Peak, the Denham and Victoria Downs, and the Great Divide in the east; and the Cheviot and Scott in the southeast. Australia boasts of no active volcanoes, but several extinct craters may be viewed in various parts of the continent, principally in Victoria.

The absence of rivers between the coast and the interior is remarkable. There is but one large river, the Murray, the length of which is 2,345 miles. The principal tributary of this river is the Darling in eastern Australia which flows in a westerly direction from the Great Divide. At the eastern tip of South Australia the Darling flows into the sea. At Sydney, New South Wales, the Parramatta River, a small stream, flows into the basin of Port Jackson. The principal rivers of northern Australia are the Roper, Gilbert, Leichhardt, Flinders, and the Mitchell. The latter flows into the Gulf of Carpentaria. From the head of this Gulf stretches a vast tableland westward. The Gascoyne, Ashburton and Murchison rivers flow through Western Australia, while the Cooper and the Macumba are the principal waters flowing through the interior of the continent. To the north of Spencer Gulf is an area of some thousand square miles set with lakes, the Lake District of Australia. The largest of these bodies of water are the Eyre, Torrens, Gairdner, and Amadeus. These dead masses of salt water change as the season is wet or dry, now sheets of water, now almost grassy plains.

Climate. The climate of the world's largest island is generally healthful, although subject to high temperature. In southern Australia the climate is temperate, in central portions it is high, and in the north a tropical climate prevails. The continent lies within the zone of the southeasterly trade winds. The prevailing westerly winds which skirt the southern shores are responsible for rains which are generally sufficient for surrounding territories. The coastal regions usually have a sufficient rainfall, but the interior is subject to extreme drought and large areas are practically arid. Australia experiences no low temperatures similar to those of Asia or northern Europe. At Sydney, New South Wales, the winters are generally warm and healthful. Snow is seldom seen in the lowland regions. Here, as in Victoria and South Australia, the temperature, influenced by the hot winds from the interior, often mounts to 115 degrees. In the mountains, however, the snowfall is oftentimes quite heavy.

Vegetation. Plant life on this continent is modified by the dryness of the climate. The most arid regions are covered with a hard, coarse plant, commonly called "porcupine grass." Large areas are covered with scrubby bushes. The trees have scanty foliage. In the more fertile regions, particularly along the east and west coasts, many species of luxuriant palms, ferns, huge eucalyptus trees, orchids, and acacias abound. No less than twenty-four species of palms are found here. The giant eucalyptus trees often soar to a height of about four hundred feet. There are large areas which produce nutritious grasses, affording abundant pasturage for immense flocks of sheep. In the



AUSTRALIAN TYPES

1 North-Australian 2 North Australian Woman 3 South Australian Woman 4 South Australian, Moroya Tribe 5 Tasmanian Woman 6 Aboriginal of New Guinea 7 Fiji Chief 8 Fiji Girl 9 Assachoreter of Taling 10 Tonga Girl of New Caledonia 11 Man of Utuan 12 Man of New Britain

most arable regions of Australia many crops common to Europe and North America are cultivated, including cotton, sugar-cane, wheat, barley, oats, maize and grapes. There are many plants, however, which are identified only with the Australian continent. Certain areas are forested with valuable timber including one hundred and fifty species of gum and three hundred species of acacia, or wattle.

Animal Life. The higher order of wild animals found in other countries are almost wholly lacking in Australia, those found here being mostly marsupials, which carry their young in an external pouch. The most widely known of this group are the kangaroo, wombat, koala, bandicoot, wallabies and opossums.

Australia is famed throughout the world for its birds of beautiful and brilliant plumage. The parrots and cockatoos, the magnificent lyre bird, the regent and rifle-bird are but a few of the most colorful birds. The largest bird found on the continent is the emu, which is nearly as large as the ostrich of Asia and Africa, attaining a height of six or seven feet. Eagles, falcons, hawks, and owls are numerous. Among the other birds common to Australia are the pelican, the Australian goose, pigeons, quail, ducks and geese.

Along the shores of Australia one finds many seals, sea-lions and dugongs, or sea-cows. There are at least one hundred species of reptiles on the continent, chief among which are the alligator and lizard. It is not uncommon here to find a lizard from four to six feet long. There are more than sixty species of snakes crawling over Australia and although no vipers exist, the snakes found here are extremely poisonous. The black snake often measures from five to eight feet in length.

Many animals common to other continents have been imported into Australia, especially sheep. Unusual success has been met with in the breeding of these animals. Excellent horses bred here are an important Australian export.

Minerals. Australia is rich in minerals. Gold was first discovered here in 1823. Up to the close of 1931, the total mineral output was valued at £1,218,000,000 ($243,600,000). Of this amount £635,200,000 ($123,040,000) was gold. For a few years following 1910 the gold output gradually decreased. Since 1928, however, this output has increased from 457,669 ounces to 713,882 ounces in 1932.

Among other important minerals on the continent are silver, copper, tin, lead, zinc, iron, coal, marble and sandstone. In 1931 the value of the chief minerals was: gold £3,563,519; silver and lead, £1,443,897; copper, £567,558; tin, £216,205; zinc, £512,795; iron, £339,791; and coal, £6,103,735. In 1931-32 there were 190,132 tons of pig iron produced.

It has been discovered that the mountains of Australia contain the fossil remains of animal life dating back probably 600,000,000 years. These discoveries have revolutionized scientific calculations as to the date of the dawn of life upon this earth.

Production and Industry. The most arable land in Australia is to be found in the coastal regions where crops similar to those grown in other countries are cultivated. In 1931-32 there was an acreage of 21,166,900 under cultivation. The principal crop is wheat. In 1931-32 there were 14,741,313 acres of wheat from which the yield was 190,612,188 bushels. There were 1,085,489 acres of oats in this same year which yielded 15,194,680 bushes. There were 3,167,459 tons of hay produced in this year from 2,634,680 acres; 404,268 tons of potatoes from 147,103 acres; and 4,213,453 tons of sugar-cane from 325,737 acres. There were 272,756 acres of orchards in 1931-32 which yielded fruit valued at £7,029,650 ($1,405,930). Australian fresh and dried fruits are exported in large quantities.

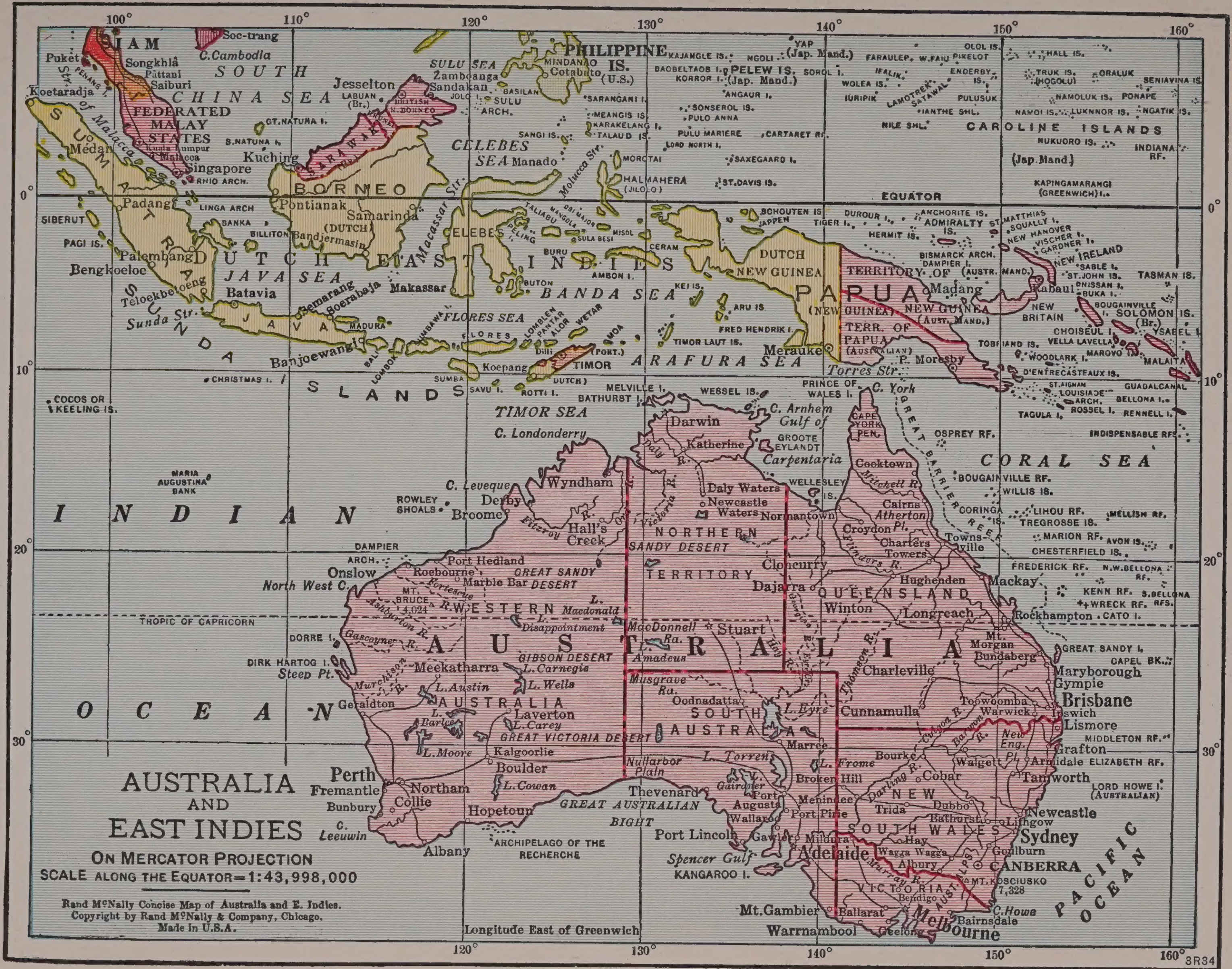
The excellent pasturage which extends over large areas has been of great importance in Australia's notable success with immense flocks of sheep. Australian wool has become a most valuable commercial product. At the close of 1930 there were 110,568,279 sheep in Australia. In 1930-31 the production of wool amounted to 912,141,253 pounds. In this same year there were 1,792,734 horses; 11,720,916 cattle; and 1,071,679 pigs. It was officially estimated at the close of 1931 that there were 108,000,000 sheep.

One of the principal industries in Australia, second only to the wool industry, is the frozen meat industry. The value of production of manufacturing industries has not merely increased, but has approximately doubled since 1913. In 1931-32 there were 21,653 industrial establishments in Australia, more than one-half of which were situated in New South Wales, 7,397; and in Victoria, 8,204. Statistics for this same year show that there were 336,654 employés in these factories. The total value of the industrial output was £281,645,785 ($56,329,157).

Transportation. Australia had 26,959 miles of Government railways open to traffic in 1932. Under the Federal Aid highway law, enacted by the Commonwealth Government, the Commonwealth provides four-sevenths and the state three-sevenths on expenditures for the construction of approved trunk highways. There were 859 miles of privately owned railways open to general traffic in 1932. Electric tramways have been put into operation in the several states of the Commonwealth. There are about 630 miles of tramways operating throughout the continent, twenty-nine miles of which are steam and twenty-six miles of cable and horse traction. Of the total mileage, the several Governments control 408 miles, private enterprise thirty-six miles, and municipal authorities 186 miles.

The Murray River is navigable inland for about 2,000 miles. Foreign trade is carried over the several oceans and seas which surround the continent.

Air transportation is becoming increasingly important in Australia. Subsidized aërial mail


SIAM
SOUTH CHINA SEA
FEDERATED MALAY STATES
Singapore
SUMATRA
BORNEO
SARAWAK
PHILIPPINE IS. (U.S.)
CELEBES SEA
DUTCH EAST INDIES
JAVA SEA
JAVA
Batavia
BANDA SEA
FLORES SEA
TIMOR
SUNDA ISLANDS
DUTCH NEW GUINEA
PAPUA
TERRITORY OF NEW GUINEA (Aust. Mand.)
TERR. OF PAPUA (Australian)
ARAFURA SEA
TIMOR SEA
Torres Str.
CAROLINE ISLANDS (Jap. Mand.)
PELEW IS. (Jap. Mand.)
EQUATOR
BISMARCK ARCH.
NEW BRITAIN
NEW IRELAND
SOLOMON IS. (Br.)
CORAL SEA
GREAT BARRIER REEF
INDIAN OCEAN
PACIFIC OCEAN
TROPIC OF CAPRICORN
AUSTRALIA
WESTERN AUSTRALIA
NORTHERN TERRITORY
QUEENSLAND
SOUTH AUSTRALIA
NEW SOUTH WALES
VICTORIA
Darwin
Perth
Adelaide
Melbourne
Sydney
CANBERRA
Brisbane
GREAT SANDY DESERT
GIBSON DESERT
GREAT VICTORIA DESERT
GREAT AUSTRALIAN BIGHT
Gulf of Carpentaria
Spencer Gulf
KANGAROO I.
COCOS OR KEELING IS.
CHRISTMAS I.
LORD HOWE I. (AUSTRALIAN)
MT. KOSCIUSKO 7,328
Longitude East of Greenwich
100° 110° 120° 130° 140° 150° 160°
0° 10° 20° 30°
3R34

AUSTRALIA AND EAST INDIES

ON MERCATOR PROJECTION

SCALE ALONG THE EQUATOR=1:43,998,000

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services operate from Perth to Derby to Wyndeham on the west coast of Western Australia; from Brisbane to Camooweal to Normantown, Queensland; from Perth to Adelaide, and from Camooweal to Daly Waters and to Birdun, North Australia. This service operates under the Air Navigation Act of 1920, a law which is administered and regulated by the Controller of Aviation. The subsidized aërial service has a route mileage of 5,314. In 1931-32 about 562,877 miles were flown by this service, over which 27,595 pounds of letters were carried and 8,558 paying state passengers.

Native Peoples. The Australian aborigine is slowly disappearing, primarily because of the advent of the white man, his customs and diseases, into the haunts and life of the native. The natives are not much shorter than the average Europeans, but they are of slimmer, feebler build. They have dusky, coffee-brown complexions. They are mainly interested in hunting and getting food, at which they show great cunning. They learn easily to chatter foreign languages. Aside from these limits, however, all is a blank to the native Australian. His only idea of right and wrong is that each man's property is his own, wives being one item in a man's chattels. During the summer months the aborigines go naked; in winter months they wrap themselves in kangaroo skins. Their diet consists chiefly in the roots of the wild yam, the opossum, lizards, snakes, and white ants. Their favorite weapon is the boomerang, a flat stick, three feet long, curved at the middle. When thrown, the boomerang jerks in a zigzag fashion and usually comes back to the thrower. They also use flint-pointed spears, shields and stone hatchers. Their language has been affiliated by many learned scholars with the Aryan, the African negro, the Hottentot, the Dravidian, the Kolarian or Munda, and Indonesian languages. Before Europeans settled in the island there were about 150,000 of these full blood aboriginals. To-day it has been estimated that there are about 60,000 natives on the continent, although the nomadic habits of the black tribes make an accurate count impossible. In 1931 there were 19,014 half castes.

Population. On June 30, 1933, a preliminary count estimated the population of Australia to be 6,623,754, excluding full blood aboriginals. It is strange that in so new and so large a country sixty per cent of the people live in cities. Recent scientific experiments have revealed the possibilities of Australia's arid land, and have attracted settlers to the northern, central and western territories. According to the estimate of 1933 the population of New South Wales is 2,600,428; Victoria, 1,818,080; Queensland, 945,565; South Australia, 580,849; West Australia, 438,113; Tasmania, 227,473; Northern Territory, 4,300; and Federal Capital Territory, 8,946.

The Federal capital, Canberra, had a population in 1933 estimated at 7,325. The population of the various state capitals in 1933 was as follows: Sydney, New South Wales, 1,262,440; Melbourne, Victoria, 1,028,300; Brisbane, Queensland, 334,000; Adelaide, South Australia, 326,032; Perth, Western Australia, 208,500; Hobart, Tasmania, 58,750.

The population is composed chiefly of European origin, predominantly British.

Religion and Education. Elementary education in Australia is compulsory and free. Higher education is made available through state scholarships and bursaries. In 1931 there were 10,097 State and 1,806 private schools. The average attendance at these schools was 1,006,927. There are six universities on the continent, one in each state capital. Technical education is fostered by the Federal Government. Undoubtedly the best known of Australia's institutions of higher learning is the University of Sydney in New South Wales, which was established in 1852. Plans are now being formulated for the establishment of a University at Canberra, the Federal Capital. Pending its foundation, there is a university college to serve the Federal Capital Territory.

Religion in Australia is entirely separate from the State. The most predominant church, however, is the Church of England. In 1931, 45.04 per cent of the population were members of this sect. There are six dioceses of the Church of England in New South Wales, five in Victoria, four in Queensland, three in Western Australia and one in South Australia, Tasmania, and New Guinea. It has been estimated that 21.53 per cent of the population belong to the Roman Catholic Church, 12.09 per cent to the Presbyterian, and 12.01 per cent to the Methodist.

Government. Australia has a Federal system of complete self-government similar to that which prevails in Canada. The Executive power, vested in the King of England, is exercised by the Governor-General, assisted by an Executive Council of thirteen responsible Ministers of State, who are, or must become within three months, members of the Federal Parliament. The Parliament consists of thirty-six Senators (at least six for each of the original states voting as one electorate), chosen for six years, and renewed to the extent of one-half every three years; and as nearly as may be, twice as many Representatives as Senators, chosen according to state population, but not less than five for any state, serving for three years. This Federal Parliament has limited and enumerated powers, the State Parliaments retaining the residuary power of government over their respective territories.

The Commonwealth. The present Dominion of Australia was inaugurated at Sydney, New South Wales, by representatives of the Crown, in 1901, the colonies having been given the status of a dominion under the British Empire. The Commonwealth now consists of the states: Tasmania, New South Wales, Victoria, Queensland, South Australia, West Australia, which were originally colonies; the Northern Territory, and the Federal Capital Territory; with outlying possessions.

TASMANIA

Tasmania was formerly known as Van Dieman's Island, and is situated 140 miles south of the mainland. It has an area which extends over 26,215 square miles. The population, according to the census of 1933, is estimated at 227,473. The capital is Hobart, which has a population of 58,750.

NEW SOUTH WALES

New South Wales became a British possession in 1788. It has an area which extends over 309,432 square miles, excluding the Federal Capital Territory, but including Lord Howe Island. The population, according to the census of 1933, is estimated at 2,600,428. The capital is Sydney, which has a population of 1,262,440.

It was only by slow degrees that New South Wales emerged from the status of a convict colony. A good deal of the first rough labor was, however, done by exported criminals, in constructing public buildings, in making roads and in clearing the land. Early in the nineteenth century some fine breed of sheep were brought to the settlement, and since the pasturage was excellent and the climate favorable, the sheep did exceedingly well and multiplied greatly. Assisted immigration eventually brought increased numbers to this region. In 1841 the reception of convicts ceased. In the early part of 1850 and the decade following, a great impulse was given to the colony by the sudden rush of miners and adventurers into the land soon after the discovery of gold.

VICTORIA

Victoria, formerly a portion of New South Wales, was proclaimed a separate colony in 1851. It has an area which extends over 87,884 square miles. The population, according to the census of 1933, is estimated at 1,818,080. The capital is Melbourne, which has a population of 1,028,300.

Next to New South Wales, Victoria is the most densely populated colony in the new Commonwealth. The principal cities are Ballarat, Bendigo or Sandhurst, Geelong, and the capital, Melbourne. The chief exports are wool, cereals, flour, hides, skins, furs, leather, butter, and livestock. The most important crop under cultivation is wheat, although oats, barley, hay and potatoes are extensively cultivated.

QUEENSLAND

Queensland, formerly a portion of New South Wales, was proclaimed a separate colony in 1859. It has an area which extends over 670,500 square miles. The population, according to the census of 1933, is estimated at 945,565. The capital is Brisbane, which has a population of 334,000.

This colony comprises the whole northeastern area of the continent, with its adjacent islands in the Pacific and in the Gulf of Carpentaria. The northern portion of the colony was, prior to 1850, known as the Moreton Bay District. From its great area and climate, its products are many and diversified. Not only are the staple cereals, grains, and vegetables cultivated, but sugar-cane, oranges, pineapples, bananas, arrow-root, tobacco, coffee and cotton are important crops. The forests afford large supplies of fine timber. Nearly all the forest trees flower and provide large supplies of honey and pollen. Consequently the raising of bees is most profitable. The winters are extremely mild and the bees are not compelled to remain in the hives and consume their own stores as is the case in colder countries. Silver, copper and tin are the principal minerals.

SOUTH AUSTRALIA

South Australia became a British Province as early as 1836. The area of the state extends over 380,070 square miles, only about one-fourth of which is settled, the rest being pastoral land, some 88,306,660 acres being under pastoral leases with a population of less than 5,000. The population, according to the census of 1933, is estimated at 580,849. The capital is Adelaide, which has a population of 326,032.

WEST AUSTRALIA

The history of West Australia dates back to 1791, although the Swan River Settlement, now West Australia, was not founded until 1829. It has an area which extends over 975,920 square miles. The population, according to the census of 1933, is estimated at 438,113. The capital is Perth, which has a population of 208,500.

NORTHERN TERRITORY

The Northern Territory was formerly a part of New South Wales. In 1863 it was annexed to South Australia, and in 1901 made a corporate part of South Australia, thus entering the Commonwealth. In 1911 it was formally surrendered to the Commonwealth, passing under its control. It has an area of 523,620 square miles. The population, according to the census of 1933, is 4,300.

FEDERAL CAPITAL TERRITORY

In January, 1911, the Commonwealth acquired a territory extending over an area of 940 square miles, from the state of New South Wales. It is situated between Sydney and Melbourne, seventy miles from the Pacific Coast. This forms the Federal Capital Territory with Canberra (population 7,325) as the capital. A corridor connects this Territory with an excellent harbor on Jervis Bay, which is also government property. The seat of government was moved from Melbourne to Canberra in 1927, and Parliament opened in its new building there by the Duke of York. Land in the Territory cannot be held in fee simple; the title must always reside in the Government.

Possessions. The possessions of Australia number four:

PAPUA

Papua, or British New Guinea, is the southeastern part of the Island of New Guinea, which is situated north of Australia. Its area is estimated to extend over 90,540 square miles. The native population is estimated at 275,000. The European population in 1931 was 1,128. The interior is partially unexplored.

TERRITORY OF NEW GUINEA

This territory was formerly German New Guinea, the northwestern quarter of the Island of New Guinea. After the World War, the League of Nations placed it under the mandate of Australia. It includes the Bismark Archipelago, with an area of 13,000 square miles; and the former German Solomon Islands, with an area of 3,400 square miles. The total area is estimated at 91,000 square miles. The native population is estimated at 520,000. The white population in 1931 was 2,850.

NORFOLK ISLAND

This island was brought under the control of the Commonwealth in 1913. It has an area which extends over 8,528 acres. In 1923, the population was 1,074.

NAURU ISLAND

This island, formerly German, was mandated to the British Empire by the League of Nations, following the World War. It has an area of about eight square miles. The population in 1932 was 2,316.

History. The date of the discovery of Australia is uncertain. The first authentic record of its existence is in a French chart of 1542. A Spaniard, in 1606, passed through Torres Strait, giving it his name. Early Dutch explorers discovered Tasmania, calling it Van Dieman's Land, in honor of the Dutch governor of the East Indian colonies. It has since been named for Abel Jansen Tasman, the navigator who first landed on it. In 1664, the states general gave the name of New Holland to the western part of Australia.

The first Englishman to set foot on Australian soil was the freebooter, William Dampier. British activity, however, did not begin until after 1768. In that year, James Cook set out in the endeavor to make observations of the transit of Venus from Tahiti, under the auspices of the English Royal Society. He also examined New Zealand, and then anchored in Botany Bay on the east coast of Australia. He sailed northward along the coast, and in June struck on a coral reef near the present port of Cairns, Queensland. He continued northward after the ship was rescued, and on August 21, 1770, raised the British flag over the north Australian peninsula of Cape York, and formally took possession of all eastern Australia for Great Britain.

New settlers hesitated to follow. In January, 1788, however, a convict ship was sent out to Botany Bay, containing over 1,000 persons, 750 of whom were under penal servitude and sentence of banishment. The date of their landing, January 26, is celebrated as Australian Foundation Day. Other penal colonies followed, the coasts of Australia being utilized for such settlement. In 1798, Dr. Bass and Captain Flinders sailed round Tasmania, thus proving it to be an island, instead of a part of Australia, as was supposed at first.

The first settlement in Tasmania was made in 1803. An effort was made to establish a colony in Victoria in 1804; it was unsuccessful. A single deserted convict remained among the aborigines until 1834, when colonization began in earnest. Queensland was founded in 1824, West Australia in 1829, and South Australia in 1832.

Exploration of the interior was very difficult. The upper Murray was explored in 1824, by Hume. In 1828, Captain Charles Sturt followed its course and discovered its tributary, the Darling. In 1830 he explored the length of the Murray to its junction with the sea near Adelaide, the capital of South Australia. After the first dangerous expeditions, the vast expanses of the interior were finally all explored and charted.

The population, which had been slowly increasing, was rapidly augmented by the influx of immigrants on the discovery of gold in 1851, and the country entered on a career of continued prosperity.

See GREAT BRITAIN; MELBOURNE; NEW SOUTH WALES; QUEENSLAND; SOUTH AUSTRALIA; SYDNEY; TASMANIA; WEST AUSTRALIA.

Australian Ballot System, the system of voting now used by all states of the United States. It originated in South Australia in 1856, and quickly spread to other Australian provinces. In 1872 it was established in England, became the system for Canada, and was adopted by Massachusetts in 1888. After considerable fraud had occurred at the polls that year, this system was generally applied. The system helps prevent fraudulent voting. Before its adoption, individual parties printed and scattered ballots, and bribery often resulted. The adaptations of the Australian system usually require that the government shall print the ballots, that the several parties shall be listed in parallel rows on a single sheet, and that the names shall be printed under the party emblem. No electioneering is allowed within fifty feet of the polls. Private booths are provided, and the voter marks his ballot in secret. If he wishes to vote for all the candidates of one party, he places an X in the circle at the top of that party. If he wishes to vote for certain candidates of one party, and certain candidates of another party, he marks an X at the side of each candidate he desires. Primary ballots also state the number of candidates for each office for whom a citizen may vote.

Austria, a constitutional republic of Central Europe, which, prior to the World War, formed the western part of the Dual Monarchy, Austria-Hungary. It is bounded on the west by Germany and Switzerland, on the north by

Germany and Czechoslovakia, on the east by Czechoslovakia and Hungary, and on the south by Yugoslavia and Italy. Its boundaries were outlined in the Treaty of St. Germain, 1919. The Republic, which was proclaimed on November 12, 1918, comprises nine provinces: the City and Province of Vienna; Lower Austria; Upper Austria; Salzburg; Styria; Carinthia; Tyrol; Vorarlberg, and Burgenland. These nine provinces, extending over an area of 32,369 square miles, are but a remnant of the once vast Austrian Empire.

Physical Features. Austria, like Switzerland, is extremely mountainous. It is crossed by some of the eastern Alps, the Rhætian and Noric Alps, which extend from Switzerland to the plains of Hungary. There are mountain peaks which rise 12,000 feet, the most notable being Gross Lockner, Gross Venediger and Wild Spitz. The Leitha mountains, a plateau of 3,000 feet elevation, are situated near Vienna. The scenic beauty of the Tyrol is comparable to that of Switzerland.

The principal rivers are the Danube and the Drave. The Danube, with its tributaries, the Lech, Inn, Traun, Enns, and the Raab, flows through the northeastern part of the Republic. The chief tributary of the Drave is the Mur. On Austria's western frontier lies Lake Constance, a famed beauty spot of the world. On the eastern frontier is Neusiedler Lake. There are many beautiful mountain lakes in the Alps. The climate is generally mild, but variable. In the north, the summer season is warm but of short duration. The winters are severe and long.

Production and Industry. Approximately thirty per cent of the population are engaged in agriculture. In 1931, there were 4,785,632 acres under cultivation. Of this total 2,126,234 acres were in Lower Austria, and 1,004,967 acres in Upper Austria. The principal crops are wheat, rye, barley, oats, potatoes, turnips, and sugar-beets. In 1932 there was harvested 354,000 metric tons of wheat from 516,230 acres; 605,900 tons of rye from 933,660 acres; 962,800 tons of sugar-beets from 1,061 acres; and 2,278,000 tons of potatoes from 479,180 acres. The Republic does not produce sufficient foodstuffs for its population.

Austria has large deposits of coal and iron, lead, silver, gold, zinc, copper, and salt. Iron ore production in 1932 amounted to 301,000 metric tons. This amount was decidedly lower than the production of 1931 which totalled 512,000 tons. This decrease was noted in other mineral productions as well. In 1932 there were 94,000 metric tons of pig iron produced (145,000 in 1931); 221,000 tons of coal (228,000 in 1931); 205,000 tons of steel ingots (328,000 in 1931); 3,103,000 tons of lignite, a production which was higher than that of 1931 when 2,982,000 tons of lignite were produced.

A goodly portion of Austria is heavily forested and timber is one of the most valuable of Austria's assets. The principal industries include the manufacturing of agricultural and industrial machinery, cotton and wool textiles, leather, and fancy goods which are famed throughout the world, woodwork, furniture, and paper. The brewing of beer, and the making of excellent wines and cider are also important industries. According to the industrial census of 1930 there were 367,458 industrial establishments in Austria which employed 1,432,936 workers. There were 170,897 establishments in the manufacturing trades and industries, and 130,770 establishments in trade, commerce and transport. On January 31, 1933, there were 763,000 new spindles installed in the textile mills. Since February 15, 1923, when the unemployed numbered 167,400, unemployment has shown a tremendous increase. On June 30, 1932 there were 380,785 unemployed throughout the Republic.

Transportation and Communications. In 1931 Austria had 4,177 miles of railway lines, 2,321 miles of which were operated by the State; 981 miles were private railways operated by the State on its own account; 331 miles were private railways operated by the State on account of their owners; and 544 miles were private railways and under the operation of private interests. There were 284 miles of light railways which were under private ownership. At the close of 1931, 511 miles of railways operated by the State had been electrified.

There are 21,273 miles of highway in Austria, 2,450 miles of which are national roads. The other highways are under provincial, departmental, or municipal operation. Telephony has been well developed in the Republic and at the close of 1930 there were 233,912 telephones in operation on the principal systems in the country.

The Austrian Air Transportation Company is under State subsidy and operates a series of regular services.

Population. According to the census report of 1923, the population of Austria was 6,534,481. On December 31, 1931, it was estimated that the population was 6,732,625. In 1931 there were 2,585 emigrants, 223 of whom went to the United States, 47 to Canada, 92 to Brazil, 286 to Argentina, and 10 to Australia. Ninety-four per cent of the population are Germans. The principal cities, with their estimated populations in 1931, are: Vienna, 1,865,780; Graz, 152,365; Linz, 101,347; Innsbruck, 56,365; Salzburg, 37,856; Wiener Neustadt, 36,956, and St. Pölten, 31,576. In 1930 the birth rate was 15.8; the death rate, 13.5.

Education and Religion. The Republic has organized its educational system under: (1) elementary schools; (2) middle schools; (3) schools for special subjects, and (4) universities. Attendance at school is compulsory between the ages of six and fourteen. The communes and provinces bear the cost of elementary education. In 1932 there were 5,342 public and private elementary schools throughout Austria. There were 29,383 teachers and the schools had an enrollment of 835,348 pupils.

There are three State universities in Austria:

Vienna, which in 1931 had a faculty of 925 members and 12,006 students; Graz, with 323 teachers and 2,258 students; and Innsbruck, with 258 teachers and 2,452 students. The State also maintains two technical high schools, one at Vienna and one at Graz. There are thirty-five training colleges for teachers in which, in 1930, there were 5,332 students registered.

Austria has ever been a powerful Catholic unit in Europe, and to-day, about ninety-four per cent of the population are Roman Catholics. Religious liberty, however, is guaranteed Austrian subjects under the law of the Republic. The Roman Catholic Church maintains two archbishoprics and four bishoprics in the Republic.

Defence. The Treaty of St. Germain (1919) limited the Austrian army to 30,000 and abolished compulsory military service. In 1931 the effective strength of the army was 22,878 men, 1,415 of whom were officers. These troops have been organized into six mixed brigades and one independent artillery regiment. The military budget for 1932-33 was 110,400,000 schillings (approximately $15,450,000). The Republic of Austria maintains no navy.

Government. The Republic of Austria was proclaimed on November 12, 1918. At the time the affairs of Government were assumed by a National Assembly. A temporary Cabinet was appointed and new laws enacted. On February 16, 1919, the National Constitutional Assembly was elected by a direct vote of the people. The Constitution of 1920, which was revised in 1929, was replaced in April, 1934, by a new Constitution. The President of the Republic is elected for a six-year term by direct vote of all citizens over twenty-one years of age.

History. Since the close of the World War the fate of Austria has been a question of international importance. In 1918 the former Austro-Hungarian Empire was stripped of its vast German-speaking territories and reduced to a small State of but 6,000,000 inhabitants. On November 12, 1918, King Charles was forced to abdicate and the Republic of Austria was proclaimed. Its boundaries were determined by the Treaty of St. Germain which was signed on September 10, 1919. The ability of this small independent Austrian state to survive the difficult economic and political problems which confronted it seemed an utter impossibility and union with Germany was looked upon as the only possible recourse, a step which Western Europe strenuously opposed. In order to prevent such a union, or *Anchluss* (economic alliance), the nations of Western Europe authorized a loan to Austria in 1923 which eased its economic situation for several years. The finances of Austria were under the direction of a League of Nations representative in Vienna. The depression, however, which undermined the economic stability of the world at large from 1929-33, struck Austria with undue force. In 1931 the Kreditanstalt, the Austrian Bank, announced its bankruptcy, an event which precipitated the financial crisis throughout the rest of the world. Then followed a period during which Austria sought to preserve her independence and to rebuild her economic structure. Banks underwent reorganization and the foreign debts of the banking institutions were drastically reduced. It was while Austria was in the midst of fortifying her independence that Hitlerism invaded Germany. The advent of Hitler in March, 1933, struck a resounding note in the internal affairs of Austria. The Pan-German party in Austria faded and was replaced by the Austrian Nazi party. It was the formation of this party and its subsequent influence in the political life of Austria that led to the February revolution of 1934. To-day as in 1918 the question of whether Austria shall unite with Germany or restore the monarchy has attracted the attention of an anxious world.

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AUSTRIAN HEIMWEHR CROSS

Dollfuss emblems were recently placed upon every statue in Vienna typifying the end of the Socialist régime in Austria. Each emblem of the Austrian Republic was replaced with the Austrian Heimwehr cross.

Nazi sentiment, aided by German propaganda, has been steadily growing in Austria with the avowed purpose of assuming control of the government. It was at such a time that Dr. Englebert Dollfuss made his power felt in the government of the Austrian State. Chancellor Dollfuss had entered public life in May, 1931 when he became Minister of Agriculture. One year later he became Federal Chancellor of Austria. He was supported by the Christian Democrats, a conservative element in Austrian political life, as well as by the Social Democrats, although the latter vigorously opposed the Nazi influence. It became quite evident to Austrians and interested bystanders of the world at large that Chancellor Hitler was bent upon establishing a dictatorship. In the Cabinet crisis which occurred in September, 1933, another attempt was made to stem the increasing power of the Nazi party by appointing members of the *Heimwehr* to official positions. The *Heimwehr* is a reactionary private army which is supervised by Prince Ernst Ruediger von Starhemberg. This Heimwehr-Dollfuss or Dollfuss-Starhemberg combine seemed to have formed an effective block to the Nazi party. Dr. Dollfuss led an untiring campaign against the Nazis in Austria.

In January, 1934, he despatched a protest to the German Government in Berlin against German intervention in the internal affairs of Austria in which he threatened to appeal to the League of Nations, should a satisfactory reply from Germany be lacking. This action of Austria at once had the effect of arousing world attention to Austrian difficulties. On February 17, Great Britain, France and Italy declared their intention to "respect and preserve the independence of Austria."

In Austria civil war was imminent. Chancellor Dollfuss found it necessary to work towards the destruction of the Social Democrats if he expected to retain the support of the Heimwehr-Starhemberg faction. The Social Democrats, fearful of complete ruin, attempted a general strike during the early part of February. They at once encountered government opposition and civil war ensued in Vienna for more than five days. Many casualties have been reported in this area. As a result of the outbreak, the Social Democratic party was disorganized and Austrians were freed from the despotism of Marxist leaders. Dr. Dollfuss was enabled to assume the rôle of dictator. The Austrian question, however, remained unsettled despite the defeat of the foes of Dollfuss. Many Austrians, stimulated by Nazi propaganda, are harboring a hatred for Dollfuss' action, which although now is but smoldering may result in a violent outbreak at any time.

The future history of Austria was affected on March 17, by the three power consultative pact which was signed at Rome by Chancellor Dollfuss, Premier Goemboes of Hungary and Benito Mussolini. The major effect of the pact will be to bind Austria to confer with Italy prior to making any move which might betray its independence, particularly through *Anchluss* with Nazi Germany. An economic agreement was also included in the pact which so closely links Austria's future to Italy. It is clearly recognized that the economic stability of Austria must be re-established if the independence of the Austrian State is to be maintained. It is towards this end that the pact was signed.

On March 27, Chancellor Dollfuss presented the capitalists of Vienna with a bill for his service in liberating them from the domination of the Socialists. The amount totalled 62,000,000 Austrian schillings or a trifle more than $10,000,000, payable in a form similar to a special income tax, known as a security tax, which varies from one-half of one per cent to six per cent for a two year period. The proceeds of this tax will be devoted to the keeping of 100,000 *Heimwehr* men under arms, who, when demobilized, are to be provided with employment by industrial and commercial concerns. Since the suppression of Socialism, Austria has become a state in which the church and clergy are expected to play an important part. A new Constitution was to be put into effect the first week in April in which the strictest sort of censorship will prevail. The Federal President will be endowed with vast powers and will be privileged to change the Constitution when, in his opinion, an emergency justifies such a change. Henceforth all legislation must be initiated by the Government. The new Constitution provides for four consultative councils:

(1) Staatsrat (or State Council), composed of from forty to fifty members to be appointed by the President.

(2) Bundeskultarrat (or Federal Cultural Council), which will be composed of representatives of churches, religious societies and schools.

(3) Federal Economic Council, representative of business, industrial, agricultural and financial circles.

(4) Provincial Council, composed of governors and finance ministers of the several provinces.

These councils will be organized to act in the capacity of an advisory body. The sessions of these councils will not be open to the public. Hereafter the people of Austria will be allowed to express their opinion at the polls only at such time as the Government deems it advisable. Federal Government control will also be extended to all higher institutions of learning and their faculties. Under the new Constitution the various provinces will retain some of the autonomy they now enjoy and will maintain local government, but a government which will be based upon an authoritative corporative principle.

The new Austrian corporative Constitution provides a centralized machinery of government in which the President may assume the law-making power and will exercise an absolute authority with powers similar to those exercised by the late Emperor Franz Josef. The chief difference in the new Constitution from the old is that all power emanates from God and not from the people. The dominant question in Austrian affairs to-day is how to preserve the integrity of Austria. On July 25, 1934, Chancellor Engelbert Dollfuss was slain in a sudden "putsch" of the Nazis in Vienna. The shot was fired by Otto Planetta, a former sergeant in the Austrian army. A state of martial law was soon proclaimed throughout Vienna following the assassination. Chancellor Dollfuss and Prince Ernst von Starhemberg co-operated wholeheartedly in the desperate fight to expel Nazism from Austria and avoid *Anchluss* with Germany. Dr. Kurt Schuschnigg was appointed Chancellor shortly after the death of Dollfuss.

Meanwhile a restoration of the Hapsburg dynasty in Austria has for a time been overshadowed by the new Government. Archduke Otto, the twenty-one year old pretender to the throne who lives in the Castle of Ham a short distance from Brussels, remains hopeful and confident of a restoration of a dynasty which had ruled over Austria for 650 years.

See AUSTRIA-HUNGARY; DOLLFUSS, ENGELBERT; GERMANY; ITALY.

Austria-Hungary, formerly the Dual Monarchy, was a loose union of two independent states, Austria and Hungary, bounded by Germany, Russia, Rumania, Servia, Turkey, Italy, and Switzerland. It extended over an area of 261,259 square miles.

In 796 Charlemagne founded Austria as a small outpost of his vast empire. Hungary was founded by Arpad in 886. For six and one-half centuries each grew independently. The name *Oesterreich* first appeared in 996. Hungary became a kingdom in 1000, Austria a duchy in 1156. With the accession of the Hapsburghs in 1282, Austria's greatness began. In 1222 Hungary won a constitution and until 1490 was the strongest state in central Europe. The Hapsburgs, meanwhile acquired Carinthia, Carniola, Styria, Tyrol, and the headship of the Holy Roman Empire, making the Hapsburgs the most powerful dynasty in the world. Vienna rapidly became the metropolis of German art and science.

In 1526 Hungary fell before Turkey, but Austria secured Bohemia, Hungary, Moravia, and Silesia, and received recognition as a European monarchy. During the Reformation, which made great progress in Hungary, Austria remained with the Roman Catholic Church. It was the bulwark of Christendom against Turkey, the mainstay of the papacy against Calvanism and Lutheranism. Its almost ceaseless wars were successful in liberating Hungary from the Turkish yoke.

In 1804 the Austrian states were united as the Empire of Austria. Its archduke became "Hereditary Emperor." In 1806 he terminated the Holy Roman Empire. Austria was a powerful force in overthrowing Napoleon. From 1815 to 1865 it opposed every attempt of the Magyars at independence. In 1848 Hungary rose under the leadership of Kossuth, but was subjected to the imperial armies with the help of Russia. Austria renewed its efforts to Germanize Hungary but failed and in the effort lost Italy and Germany. Independence and self-government were restored to Hungary and arrangements were made that united Austria-Hungary in a real union founded upon the Pragmatic Sanction dated, 1721-1722. By this fundamental law all parts of the old Hapsburg Empire were united under the rule of its dynasty and bound to common defense against foreign attacks. Austria and Hungary had one army (although each country maintained its own army and in addition supported the Austrian-Hungarian army), one coinage, diplomatic service, sovereign, and tariff. Foreign affairs and war were managed by a dual committee called the Delegations. Each country, however, maintained its own ministry and premier.

The assassination of the Archduke Franz Ferdinand on June 28, 1914, by a Serbian in Sarajevo, Bosnia, precipitated the World War, a struggle which destroyed the structure of the Dual Monarchy. In its place arose Czechoslovakia and Yugoslavia, while Austria was left a small mountainous republic with scanty resources and little industry to support the capital city of Vienna. The Emperor Francis Joseph II, who had held together the crazy patchwork of Austria-Hungary since 1848, died in 1916. He was succeeded by Charles (Karl) I, his grand-nephew. Charles was deposed at the end of the war, and after making two attempts to regain the throne, died in exile.

See AUSTRIA; BOHEMIA; BOSNIA; DALMATIA; FERDINAND I; GERMANY; HAPSBURG, HOUSE OF; HUNGARY; KAUNITZ, WENZEL ANTON; MARIA THERESA; QUADRUPLE ALLIANCE; SAXONY; SILESIA; ST. GERMAIN, TREATY OF; WORLD WAR.

Austrian Succession, War of the, a war on the continent of Europe which broke out in 1741 to defend the rights of Maria Theresa in her Austrian dominions, left to her, in what is called the "Pragmatic Sanction," by her father, Emperor Charles VI., who died without male issue. These dominions were claimed by some pretenders, notably by Charles Albert, elector of Bavaria (descending from Ferdinand I.), and by Augustus III., elector of Saxony (husband of the eldest daughter of the Emperor Joseph I.). In the struggle Britain allied herself with Austria, Russia, Hungary, and Poland, against France, Prussia, Spain, Sardinia, and Bavaria. The war continued from 1741 to 1748, when it was terminated by the Peace of Aix-la-Chapelle, Austria emerging from the conflict with the loss of Silesia, Parma, and Piacenza. The chief incidents of the war were the defeat of the French by the British at Dettingen, and the French victory of Fontenoy over the Duke of Cumberland (British), and the allied Austrians, Dutch, and Hanoverians (Prussia having, in 1742, withdrawn from the struggle at the close of what is known as the first Silesian war). Other phases of the war of the period between the English and the French are known as King George's war, and the attempt of Prince Charles Edward Stuart, "the Young Pretender," to effect a landing in Scotland in 1745, and who, after winning the battle of Prestonpans, was routed in the battle of Culloden Moor.

Auto-da-fé (*a'to-da-fā'*) or **Act of Faith,** a ceremony, often of a hideously fantastic and inhuman kind, by which the guilt or innocence of a heretical human victim was inquired into or set forth by the Spanish Inquisition. During these ceremonies and processions, a large concourse of people were generally gathered together, to witness what mostly happened, the handing over of the victim to the secular power to be put to death at the stake. Autos-da-fé were, in the 17th century, of frequent occurrence in Seville and Madrid, as well as in some cities of Portugal.

Automobile (*au'tō-mō'bēl*), a vehicle for street and road use, which carries its own motive power. And strange to say, far from being a recent invention, the automobile was invented in 1802, before the first successful locomotive, was used until 1836, and then was forgotten until nearly 1890!

It sounds incredible that so useful a machine as the automobile should have been forgotten. Men had experimented with the idea of self-propelled vehicles since the days of Sir Isaac Newton, but without success until 1802, when Richard Trevithick built a steam automobile and drove it 90 miles from Camborne to London. The machine was crude—it looked more like the ancestor of a farm tractor than of the motor car—but it worked, and stimulated other inventors. By 1824 steam motor busses were running in and about London; but they lasted only until 1836, when the outcry against their noise and dirt, supposed danger, and damage done to roads, together with the growing popularity of the railroad, killed them off. The early steam automobile was too primitive to make it survive, and the automobile idea had to slumber until the invention of the gasoline engine revived it.

GASOLINE ENGINES INTRODUCED

The first reappearance of the idea was in 1872, when George G. Selden applied for a United States patent covering the use of a two-cycle gasoline engine, a clutch, and transmission gears as parts of a self-propelled vehicle. The patent was not granted until 1895, and in the meantime no results of Selden's efforts came to public notice. The first public reappearance of the automobile came rather in Europe, when Gottlieb Daimler of Germany invented the necessary engine in 1884, and Charles Benz of Belgium built a three-wheel automobile in 1886. Levassor, of the Panhard and Levossor woodworking firm in France, made many improvements in the Daimler ideas; Elwood Haynes built a successful American automobile in 1893; and from then on the idea boomed on both sides of the Atlantic.

These first automobiles, with all their crudities, were much the same in principle as the cars of today. Levassor transferred the engine from beneath the body to the front end; we have multiplied the number of cylinders and changed the body from a carriage-like form to the "stream lines" of today; but the basic principles are the same as in the first coughing, rattling cars that scared the horses back in 1893. The development has been in refinement of detail and tremendously increased efficiency rather than in basic principle.

IMPORTANT PARTS

At first the French held the lead in this development—a fact which is reflected in many automobile terms of today. For instance: The French called the framework upon which a heavy cannon stood a *chassis*, and since the framework of an automobile looked much the same, the same word was used. When the first automobiles appeared on the roads, French bicyclists contemptuously called their drivers "chauffeurs," *chauffeur* being the French term for a locomotive fireman. The rear seat was dubbed a *tonneau*—meaning "hogshead,"—because its bulging lines in early models resembled a barrel cut in half.

But while the French and English did wonders in refining and developing the automobiles, the Americans led in development of manufacturing methods. American "quantity production" in huge factories, where every man specialized on one detailed operation, while it did not build cars as fine as those of Europe, resulted in a low cost, and thus did much to popularize the automobile. The United States took the lead over the entire world in making *good* cars after 1910, although Europe still produces the *best*—at correspondingly high cost, of course.

Any modern gasoline automobile, of whatever make, is remarkably like any rival in general principle and design. Two heavy steel beams, with several lighter crossbeams, make up the *frame*. At each end, these beams are supported on springs, which rest in turn on the axle of the front wheels and the axle-housing, or cover containing the true axles, of the rear wheels. Between the front ends of the side-beams is the motor with its accessories, such as electric starter, radiator for cooling, etc.

The so-called "body," or part in which the passengers ride, rests on top of the frame, behind the bonnet and dashboard which enclose the engine. If the body is open on top and accommodates from five to seven passengers, the car is of the *touring* type. Originally a *roadster* was an open car accommodating two, but the term is now broadened to include cars with a close-set rear seat. If the car is roofed over and the rear seat is enclosed, the vehicle is a *limousine*—or *landaulet*, if the rear seat covering is removable. If a five or seven-passenger body is permanently enclosed all around, the car is a *sedan* or *berliet*, while a permanently enclosed two-seater is a *coupe*. Most of these names are borrowed from corresponding vehicles of horse-carriage days.

HOW AN AUTOMOBILE WORKS

The articles and pictures on this page and next will give you a clear idea of exactly how an automobile works. Since the engine is described and explained in the article on Gas Engine (q.v.) we shall devote these two pages to explaining the clutch, transmission gears, and differential—features which to most people are even more mysterious than the engine. The pictures were specially prepared with the idea of making everything absolutely clear. If you will look at them as you read, and take pains to see how everything said in the text works out in the picture, you will have a better idea of how a car works than many a man who has driven for years.

NOTE.—The purposes of the various devices described are given in the article on Automobile. Here we describe *how they work.*

THE CLUTCH

We cannot shift gears while power is passing through them to the wheels. Therefore an automobile needs a "cut-off" device, so the driver may stop the flow of power without shutting off engine, when he wants to shift gears. He does this by means of the *clutch.*

The clutch described here is of the multiple disk type. Power runs through it from left to right, as shown. The parts are opened out far more than in an actual clutch, in order to show how they work.

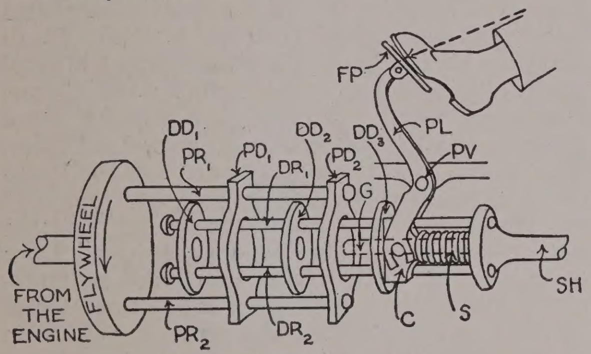


FIGURE 1

Look first at Fig. 1. Running out from the flywheel are two rods, PR_1 and PR_2, shown much longer than in an actual clutch. Whenever the engine is running, these rods go around with the flywheel, carrying the two *driving disks*, PD_1 and PD_2. These disks slide freely along the rods, but rotate with them. These rods and disks make up the "driving" part of the clutch.

At the right of Fig. 1 is a shaft-head SH, from the gear-box. On the shaft-head are two rods, DR_1 and DR_2, extending leftward through holes in the driving disks, and bearing three sliding disks, called the *driven* disks. These rods and disks form the *driven system* of the clutch.

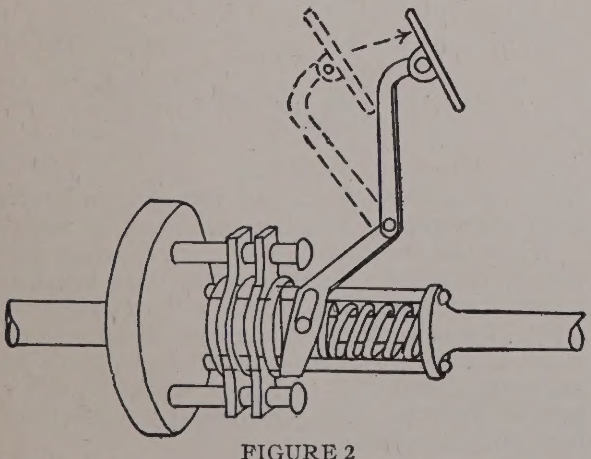
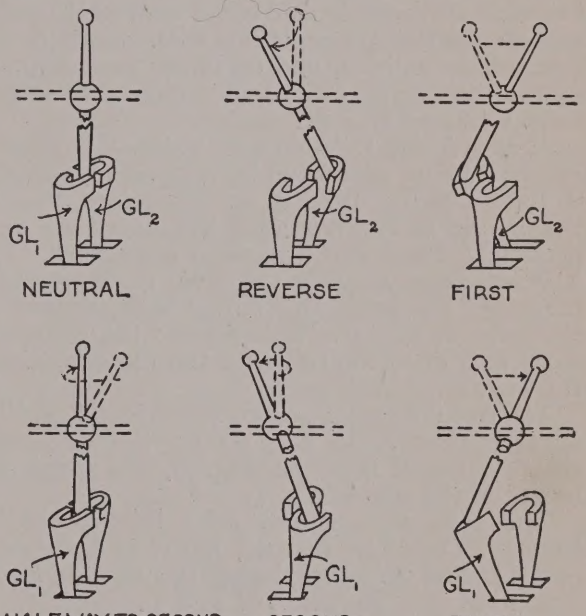


FIGURE 2

Now look to the right of Fig. 1. Extending from the shaft-head is a guide-rod, G, shown by dotted lines. Mounted on it is a sliding collar C, kept pressed to the left by the spring S, as shown in Fig. 2. (Remember that all parts in Figs. 1 and 2 have been separated unduly, for clearness.) Attached to the collar is the lower part of the lever-pedal, PL, the lever being pivoted at PV.

When the driver wants to cut off the power, he presses the foot-pedal (FP) forward, as shown in Fig. 1. This moves the collar back against the spring, and allows the disks to fly apart. Since now there is no contact between the disks, the driving system spins idly around the driven system without transmitting power. When the driver wants to go, he releases the pedal, the spring jams the disks together, the driving disks set the driven disks rotating, and the shaft-head sends power through the gears to the wheels.



NEUTRAL REVERSE FIRST

HALF-WAY TO SECOND SECOND THIRD

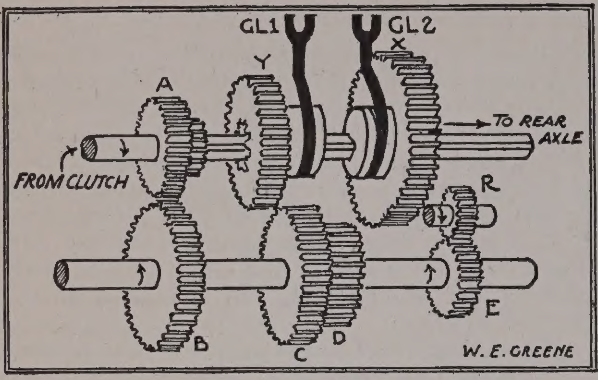
FIGURE 3

THE GEARS

The driver shifts gears by means of a hand-lever. The various movements of this lever are transformed, as shown in Fig. 3, into backward and forward movements of two gear-box levers. With this in mind we are ready to examine the gears themselves, see how they are shifted, and what they do.

The gears as shown in Fig. 4 are in *neutral.* Power from the clutch enters as shown, and drives the gear-wheel A. This wheel is meshed with wheel B on the rod CS, called the *counter-*

shaft. The two wheels rotate as shown by arrows. Rotating with the countershaft are gear-wheels C, D, E, and R, the last, you will notice in a direction opposite to the others. So long as the gears are in neutral this countershaft system is all that rotates.



Extending into the gear-box from the left is the driving shaft and gear A; from the right, the driving-shaft S, which is connected to the rear-axle drive-shaft through a universal joint at rear of the transmission case. Shaft S is squared or splined, and on it are two sliding gears fitted with collars in which gear-shift forks GL^1 and GL^2 fit.

A and S are independent units, the front end of S being connected by a bronze bushing or roller-bearing fitted in A. Therefore, when the motor is running and the gears are in neutral, A turns and S remains stationary.

What happens when the lever is thrown in reverse? The lever GL^2 moves back, enmeshing gears X and R. This rotates the driving shaft in a direction opposite the motor's, and the car moves backward.

The rest is simple. A movement into "first" engages gear X in gear D on the counter shaft. Since X is larger than D, X's speed is less than the engine's.

The first part of the shift to "second" brings X back to neutral, half-way between gears D and R. Completing the shift moves lever GL^1 and enmeshes Y and C. Since the gear wheels are more nearly equal, the driving shaft rotates more nearly at the engine's speed.

To understand "third" look at gear Y. Its left face has a collar with inside gearing. Whenever GL^1 moves forward, this inside gear meshes with the smaller gear of A (both gears on shaft A are cut in one piece). The engine is now "directly connected" with the driving-shaft S, and both rotate at the same speed (W. E. Greene).

THE DIFFERENTIAL

The working parts of the *differential,* which distributes power between the rear wheels when they are running at unequal rates, are shown in diagram III of Fig. 5, as mounted in the middle of the rear-axle. The *housing,* or cover, in which they are enclosed, is indicated by dotted lines.

Power from the gear-box is transmitted along the shaft S to the pinion gear, (P). The pinion is enmeshed in the large gear-wheel B, called the *bevel gear,* and makes it rotate. Examine this gear in detail, as shown in diagram I of Fig. 5.

Running through the wheel from side to side is an axle, like the diameter of a circle. Mounted on this rod are two little gear-wheels, D_1 and D_2, bevelled as shown. When the bevel gear rotates it carries the rod and the two little gears around with itself.

This whole structure is sandwiched in between two gear wheels, L and R, shown in diagrams B and C, mounted on the axle shafts from the left and right wheels respectively. The bevel-gear structure is held in place by the pressure of these two wheels, L and R, against the little gear-wheels D_1 and D_2, and the axle rod has space in which to rotate between the faces of the large gears. Therefore the whole combination goes round and round, whenever the pinion-gear applies power to the bevel.

But how do the little gear-wheels, D_1 and D_2, get around when they are engaged on each side by the large wheels, L and R? If the bevel-gear were rotating in the direction shown, and only the gear-wheel L were present, as in diagram II, the little wheels could get around nicely, by spinning counter-clock-wise against the larger wheel. If only gear-wheel R were present, the little gears could spin clock-wise. But when *both* large gears are present, and offering equal resistance to rotation—as they do when the automobile is going straight ahead—what can the little gears do? They cannot spin both clock-wise and counter-clock-wise at the same time; so they do not spin at all, but carry both large gears around with them, thus they distribute power equally to both rear wheels, which is just what we want.

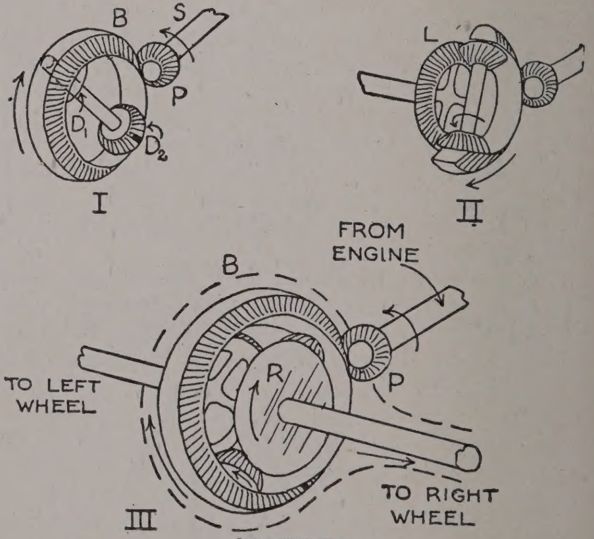


FIGURE 5

When the automobile hits a curve, with say the right wheel on the outside, this balance between gear-wheels R and L is upset. R goes a little faster than its companion, and the little gears can rotate clock-wise on their axes, as shown in diagram C of Fig. 5, until the automobile gets on the straightaway and they become motionless again.

THE GEARS

Power is transmitted from the engine in front to the rear wheels by a succession of interesting devices, made necessary by the fact that when the gasoline engine runs at all, it must run at comparatively high speed. Consequently, a suitable device, known as the *transmission gear*, must be introduced in the line of power, to gear down the engine speed and raise the power for starting, and apply the engine speed direct when the car is under way. The favorite type is known as the *sliding-gear* transmission, and is described in the accompanying explanation of "How An Automobile Works." A few cars still retain the *planetary* gear, where gears of different sizes are brought into contact with the edge of a single gear-wheel to accomplish the desired purpose.

Gears, however, cannot be changed while power is passing through them. All automobiles therefore have a "cut-off" device known as a *clutch*, to cut off the flow of power from the engine to the gears while shifts are being made. The favorite type is the *multiple-disc* clutch, described herewith, but the *cone*-clutch still has some following. The *differential* is a device for distributing power between the two rear wheels, and is made necessary by the fact that the wheels run unequal distances, and therefore need an unequal distribution of power, when the car goes around a curve.

The *auto-truck* is the same in principle as the pleasure car, save that it is heavier and has a special body, adapted to hauling. The *steam-car* uses a steam engine (*q. v.*) instead of a gasoline engine, but otherwise is much the same as a gasoline car. In the hands of a skilled driver, it has many advantages; but the greater ease with which a gasoline car may be driven has given the gasoline type greater popular favor. The *electric* is the simplest of all, for it simply applies the power of an electric motor, through suitable gears, to the wheels. It is run by current obtained from a storage battery, and the necessity of being near a charging station has confined its use so far to the cities. Since most automobile users want a car which will go anywhere, this limited range of the electric has retarded its sale. An increase in range, however, or the multiplication of charging stations in rural districts, may change this condition.

Autumn Coloration, (in plants). This phenomenon is associated with the deciduous habit, and is displayed by shrubs and trees throughout the temperate regious. The vivid colors have attracted a great deal of attention, but as yet no adequate explanation has been offered. The two types of color which appear, the reds and the yellows, seem to be due to different causes. The yellow is a post-mortem change of the green, an example of which may be observed in a poorly blanched stalk of celery, where the transition from green to white is seen to be through yellow. The red color is a product of the living substance of the leaves, manufactured at a time when the work of the leaf is beginning to flag. It has been suggested that the red color is of incidental advantage to the plant in that it raises the temperature of the leaves slightly and in this way protects the living substance from chill while it is retreating into the permanent parts of the plant previous to the fall of the leaves.

Auvergne (*o'vârn'y'*), a branch of the Cevennes Mountains. The mountains lie in confused groups, sending up several summits to the height of 6,000 feet. Not only do the cone and domelike shapes of the summits betray a volcanic formation, but the great masses of peculiar rock that break through the crust of granite and gneiss render it evident that this was a great focus of volcanic action at a comparatively recent period. Among the summits that have apparently been at one time volcanoes, the most remarkable are Cantal, Mont-Doré and Puy-de-Dôme. All are now covered with verdure. There are rich deposits of iron, lead and other ores in the region, which was once an ancient province and today is a department of France.

Av'alanche, a mass of snow or ice which slides down the sides of high mountains, often causing great destruction. There are various kinds of avalanches. Drift or powder avalanches are loose, dry snow, which is set in motion by the wind, and rushes into valleys in the form of great dust-clouds. They usually occur in winter and are very dangerous, because of their suddenness, often suffocating men and animals and overturning houses by the compression of air which they cause. Another kind of avalanche is like a landslide. The melting of the snow in spring makes the soil slippery, and great masses of snow are carried down the mountains by their own weight, taking trees and stones with them. If they come to a precipice in their course, as they often do, they are hurled with tremendous force into the valley beneath, destroying whatever is in their path.

Ice avalanches often occur. They are masses of ice which detach themselves from the mountain glaciers, commonly in July, August and September. Nine great Alpine avalanches, which destroyed 447 lives, are recorded between the years 1578 and 1827.

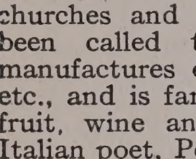
Avebury, Baron, SEE LUBBOCK, SIR JOHN.

Aver'nus, now called Lago d'Averno, is a small circular lake in Italy. It is about a mile and a half around, and lies in the crater of an extinct volcano. It is in some places 200 feet deep, and is almost completely shut in by steep and wooded heights. The sulphurous vapors arising from it were believed in ancient times to kill the birds that flew over it, and so it probably got its name from a Greek work meaning "birdless." Its gloomy and awful appearance made it the center of almost all the stories of the ancients about the world of shades. Here was Homer's and Vergil's entrance into the lower world, and here were the Elysian fields, the cave of Hecate and the grotto of the Cumæan Sibyl. Agrippa connected it with the Lucrine Lake and the sea, making it a sort of harbor; but the volcanic upheaval of Monte Nuovo, in 1358, again made Avernus an inland lake. On its east side are the ruins of a temple of Apollo, and on its south side what is shown as the grotto of the Sibyl.

Avignon (*ä-vēn-yōN'*), a city in Provence, France, is on the left bank of the Rhone. Its streets are narrow and crooked, and it is still surrounded by high walls. Here is the cathedral of Notre Dame, dating back to the 11th century. There are so many churches and convents that Avignon has been called the city of bells. It has manufactures of paper, leather, silk, iron, etc., and is famous for its garden produce, fruit, wine and honey. Here the great Italian poet, Petrarch, lived for some years, and here in a church that is still pointed out, he first saw Laura, the lady to whom he wrote his beautiful sonnets. In the middle ages Avignon belonged to the popes, and here Clement V and six of his successors lived. Here also lived the antipopes for forty years. Population, 51,000.

A'von. There are several rivers of this name in England, Scotland, Wales and France. The most noted is called Upper Avon, which gains its importance from passing Stratford, the birthplace of Shakespeare. It rises in Northamptonshire, and flows southwest till it joins the Severn at Tewkesbury. It is about 100 miles long.

Ax'il (in plants). The upper angle formed by a leaf and the stem axis on which it is inserted. It is in the axils that branches normally arise.

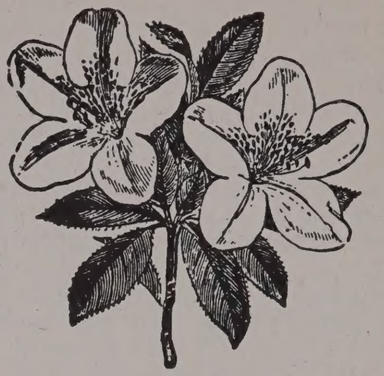


a, a, AXILS

Aylesworth, Hon. Allen Bristol, K. C., educated at Toronto University. A distinguished lawyer. One of His Majesty's Commissioners in the Alaska Boundary case. Elected to the Canadian House of Commons in 1905, a prominent member of the Laurier government. Appointed Postmaster General in 1905, and Minister of Justice in 1906. One of the ablest and most influential members of the Laurier administration.

Aylmer (*āl'mĕr*), **Col. the Hon. Matthew,** Adjutant General of Militia (Canada). Eldest son of Lord Aylmer. Born in province of Quebec in 1842. Educated in Montreal and at Trinity College, Dublin. Entered the army as Ensign in Her Majesty's 7th Royal Fusiliers then quartered at Malta (1864). Retired from the Imperial Service in 1870. In 1896 he became Adjutant General of the Militia of the Dominion. Was second in command of all the colonial forces that took part in the Diamond Jubilee celebration in England. A thorough soldier and successful administrator.

Azalea (*a-zāl'ya*), a flowering plant belonging to the Heath family, closely related to the rhododendron. It covers mountain slopes, is a native of the countries bordering on the Black Sea, and abounds in North America. They are among the most ornamental and beautiful of flowering shrubs, and are well represented by native forms in our eastern mountain regions. In the flowering season they are often completely covered with showy flowers of various bright colors.



AZALEA

The pink azalea, often called the wild honeysuckle, is distributed from Maine to Illinois and south to the Gulf of Mexico. It is a shrub from two to six feet high, the flowers grow in clusters, bloom in April and May, giving rosy hue to swamp and moist wood. Closely related to this is the clammy azalea or white honeysuckle, a shrub from three to ten feet high, bearing fragrant white blossoms in early summer. It is seen as a rule in swamps along the coast, found from Maine to Florida and westward to Texas. Decking the mountains of Georgia is the smooth or tree azalea, with June flowers of rare fragrance.

Azerbaijan (*a-'zer-bi-jan'*), was formerly one of the Caucasian states of Russia, but became independent as a result of the World War (*q. v.*), population 4,615,000. Capital, Baku (*q. v.*), population 177,777.

Azari'ah, the tenth king of Judah, also called Uzziah, who began to reign about 809 B. C. It is also the name of one of the prophet Daniel's three friends, whose name was changed to Abednego. It is a common name among the Jews. The period of azariah's reign is 792–740 B. C.

Azores (*a-zōrz'*), a group of Portuguese islands in the mid-Atlantic, 800 miles west of Portugal. Carthaginian coins have been found on the islands, showing that the hardy sailors of Carthage must have been there. Edrisi, an Arab geographer, knew them before 1200, and an Italian map of 1351 represents them unmistakably. The islands were taken possession of by the Portuguese in 1431–1453 There are many hawks here, and the name Azores is from a Portuguese word, meaning hawks Their area is 919 square miles. or considerably smaller than

Rhode Island. The total population is 260,000. The capital is Angra (population, 11,067). They are of volcanic origin, and are still liable to eruptions and earthquakes, having had twenty-one earthquake shocks since 1444. Oranges are the chief export.

Azov (*ȧ-zŏv′*), **Sea of,** is a large gulf in the Black Sea. It was first called the Mæotic Marsh, from the name of the people dwelling on its shores. The Turks called it Fish Sea. The water is almost fresh. The whole sea is shallow, and measures 235 by 110 miles. The largest river emptying into it is the Don. During the Crimean War, there were sent to this sea, in 1855, a number of war vessels having on board 16,500 French, English and Turks. With this hostile array, the allies bombarded the ports and cut off supplies intended for Sebastopol.

Az′tecs, the name of the people found in Mexico at the time of the Spanish invasion, 1519, though the name strictly belongs to only one of the seven tribes occupying the country at that time. Aztec tradition represents these people as starting from a place called Aztlan and wandering for about 150 years before reaching Chapultepec. Where Aztlan was, and what was the origin of the Aztec tribes, are still doubtful. Mexico had been previously occupied by a people called Toltecs, a superior race whose ruins still prove skill in the arts of civilized life. These Toltecs were almost destroyed by famine and pestilence in the 11th century, so that the Aztecs found only a few rude, savage races occupying the land. In 1325, they built the City of Mexico, called Tenochtitlan, named after their chief, Tenoch. It was built on a few small islands in Lake Chalco, and was approached only by long and narrow causeways. It was so strongly fortified as to resist even the conquering Spaniards. The Aztecs seem to have been a fierce, savage people, yet with many traces of civilization, some of it probably borrowed from the Toltecs who preceded them. Their chief was chosen by the nobles; the laws were severe, but the courts were open. The records are preserved in the picture-writing of Mexico; the women shared in all the occupations of the men, and were taught to read and write, sing and dance, and were even learned in astronomy and astrology. They believed in one god, but they had many lower gods, of whom the chief was the frightful Huitzilopochtli. His magnificent temples were drenched with the blood of human sacrifices; no less than 20,000 victims, of whom only the heart was used as an offering, were immolated yearly to supply his altars. The priests were a large and powerful class, who had charge of the education as well as the religion of the nation; 5,000 were attached to the great temple of Mexico alone. The last king of the Aztecs was Moctezuma, who was treacherously imprisoned by Cortés and killed by the Aztecs in their revolt against the Spaniards. See *Popular History of the Mexican People* and *Native Races of the Pacific States*, by Hubert H. Bancroft

B

B (*bē*), the second letter, is a consonant, and is called a sonant labial, because made by the lips and representing a sound, as in *able*, *boy*, *cab*. After *m* in the same syllable or before *t*, it usually is silent, as in *bomb*, *debt*, *bdellium*. The form is Roman, from Greek **β**, which, perhaps, is of Phœnician origin. All letters of the English alphabet, except *J*, *U* and *W*, come from the Latin, which derived them through the Greek from the Phœnician.

Baal (*bā'ăl*), the principal god of the Phœnician and Canaanitish nations, among whom Ashtoreth was the principal goddess. He was the god of the sun, as ruling and giving life to nature, while Moloch represented the sun as a destroyer, and both these ideas were united later in the god Melkarth. The oldest form of his worship was on the tops of mountains; thus the Midianites and Amalekites worshiped him on Mount Peor; the Phœnicians on Carmel and the Canaanites on Hermon. Upright conical stones, either in the open air or in temples, were a mark of his presence, but there were no images of him. From the earliest foundations of Tyre he seems to have been the protecting god of that city. His worship spread among all the towns of Phœnicia, including their distant colonies, such as Malta, Carthage and Cadiz. The Greeks connected him with Hercules, calling him the Tyrian Hercules. The worship of Baal was very attractive to the Jews, and many years of punishment were necessary to banish it from Israel. The word Baal is often used in connection with some epithet; as Baal-Berith (the Covenant Lord), and Baal-Zebub or Beelzebub (the Fly-God), the idol of the Philistines at Ekron, where he had a temple. Such proper names as Jezebel and Hannibal are compounds of the word Baal.

Babcock Test, a method of determining the amount of butter-fat in milk, named after Prof. S. M. Babcock, of Wisconsin Agricultural Experiment Station, who invented it in 1890. It depends upon (1) the separation of light from heavy parts by centrifugal force and (2) the action of sulphuric acid on all the solids of the milk other than butter-fat. The machine consists of deep brass cups attached to an upright revolving shaft, so that they will swing out horizontally when the machine is rotated by hand or steam power. In the cups are placed Babcock milk bottles. These are vase shaped with long narrow necks, and hold about 2½ cubic inches. Almost equal parts of milk and acid are mixed in the bottles in a special way. The acid decomposes the other solids and frees the fat. Being warmed by the chemical action, the fat particles run together, and being so much lighter than the acid mixture, the fat rises into the neck, which is so graduated that the amount of fat can be read off in percent. The rapid rotation of 900 to 2,000 or more revolutions per minute separates practically all the fat. The Babcock test was the first practical method of testing milk for commercial use. It has made it possible for creameries to pay for milk on a basis of cream value and has made it possible for the dairyman to estimate accurately the performance of each of his cows and so tell the amount of cream produced by each. Milk from different cows may vary in amount of butter-fat from 2% to 8%. Some cows will test less than others, but may, by reason of a greater quantity of milk, produce the same amount of butter. Milk for retailing is usually required by law to test at least 3% of cream. Cream is sold in different grades, as 12%, 18%, etc. See CREAM SEPARATOR.

Ba'bel, Tower of. According to the story in Genesis xi, the descendants of Noah journeyed from the east till they came to the plain of Shinar (Chaldæa), the Hebrew form of the native name Sumir, and there began to build a tower of burned bricks and pitch, whose top should reach the sky. But God confounded the language of the builders so that they could not understand each other, and the tower was called Babel or Confusion. A similar story has been found among the Babylonians, and the Greek story of the giants who attempted to scale the sky but were overthrown by Zeus has some likeness to it. The site of the tower was somewhere in Babylonia. It is usually supposed to be represented by the great pile of Birs Nimrud, which stood eight miles from the city of Babylon, was dedicated to Nebo, and was called the Temple of the Seven Lights. It had stood unfinished, till Nebuchadnezzar undertook to finish it, and its ruins still rise 153 feet above the plain. Another possible site is the ruin called Amram, within the city itself. This mound is 1,100 yards long, and 800 yards wide.

Babies—How to Care for Them

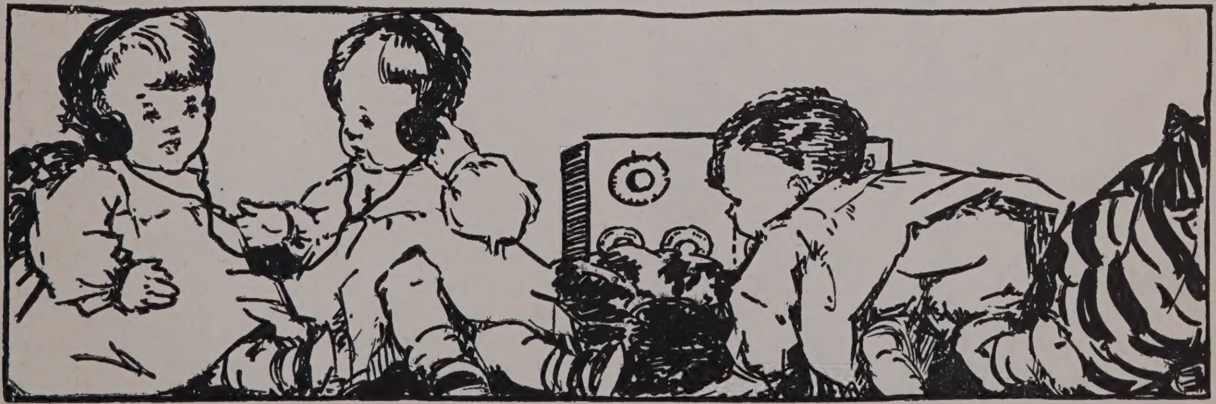
This is an article not only for mother, but for "big sister" also, even though she be but twelve years of age.

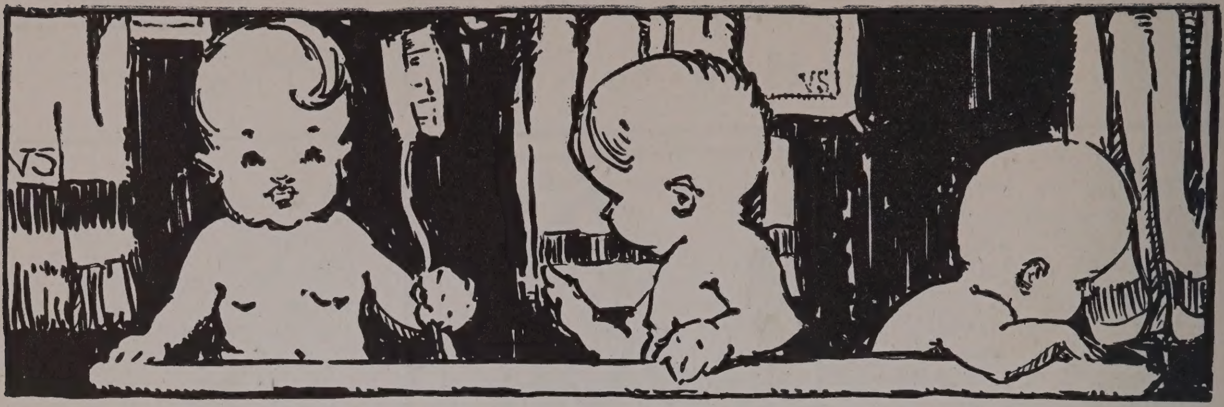
When "little brother" or "little sister" comes into our home, it is very tender and helpless, and wishes to do only one thing: grow. And as we know more about baby, and what we may do to assist it in growing, the happier will be our home.

Let us consider first the feeding. One of the most important factors is regularity. Do not feed a baby just because it cries. Regularity in feeding is necessary for the proper growth, health and contentment of the infant. Pacifiers are not recommended, for they are likely to cause the baby to overwork and enlarge its throat muscles. During the first day of birth the infant should have only one to two teaspoonfuls of water, and the first nursing may be given four hours after birth, and repeated every four hours, for five to ten minutes. The infant should be removed several times during the feeding, to permit it to expel gas; gentle patting on the back may assist it in the process. A recommended schedule for babies under five months is: feed, 7 to 7:30; sleep, 7:30 to 9:30; bath, 9:30 to 10:00; sleep, 10:30 to 1:00; feed, 1:00 to 1:30; sleep, 1:30 to 3:30; awake, 3:30 to 6:00; feed, 6:00 to 6:30; sleep, 6:30 to 10:30; feed, 10:30 to 11:00; sleep, 11:00 to 7:00. The whole series of time may be set forward or backward a little, to accommodate individual home habits.

The feeding schedule changes as baby advances from five months to a year. Here is a standard table. In its application, bear in mind that individual cases vary, and doctor's orders are to be obtained and followed: nurse, 6:00; between 6:00 and 10:00 one to two tablespoonfull strained orange juice, diluted at first; 10:00 cereas paste, one-half to three level tablespoonfuls, then nurse; 2:00, beef juice, one to one and one-half tablespoonfuls, dilute at first, start giving one-half teaspoonful of vegetable, strained (at eleven months one tablespoonful each of two vegetables, cooked one-half hour, as peas, spinach, potatoes, carrots), and nurse; 6:00 nurse after food (at ten months baby is given as much as three level tablespoonfuls of cereal at this time); 10:00, nurse (may discontinue at eleven months).

In general comment the following facts are of importance: nurse after, not before, giving other foods; absolute cleanliness of bottles and containers is imperative; never give milk from cows eating ensilage; if the baby is in the city, feed certified milk if infant is not nursing; a baby may be overfed as well as underfed; after the first few months, and continuing during all growing child development, the drinking of milk, and eating of cereals are essential factors in the building of the body; fruits should be eaten fresh or dried, and vegetables should be cooked one-half hour or less, for canning or excessive cooking is likely to destroy the vitamines necessary to proper health and growth. New canning methods are coming in vogue by which heat is not applied for a sufficient time to destroy the value of the vitamines, but dried fruit is especially good.





The general causes of colic are: too rapid and over feeding, or the excessive use of cathartics.

Vomiting generally indicates that there is too much fat in the food mixture.

Diarrhea may be caused by too much sugar, or milk too rich, and indicates that baby is not receiving a proper food mixture.

Constipation, in general, is caused by boiled milk, abuse of cathartics, too much fat in food mixture, lack of fruit juice, and insufficient water.

The following height and weight development chart is for the average boy. Girls will agree with it, approximately, at birth; by the end of the first year there is a variance of one-half inch and one-half pound less. If the child weighs twenty per cent. over the figures it should be examined, as excessive over-weight, as well as under-weight, may indicate general debility. At birth, 20.6 in., 7.55 lb; two months, 22.5 in., 10.4 lb; four months, 24.5 in., 13.2 lb.; six months, 26.5 in., 16 lb.; ten months; 28.5 in., 19.3 lb.; one year, 29.5 in., 21 lb.; one and one-half years, 32 in., 24.5 lb.; two years, 34 in., 27.3 lb.; two and one-half years, 36 in.; 30 lb.; three years, 37.5 in., 32.5 lb.

An infant should be bathed once each day, testing temperature of the water with the back of the hand, or, better yet, the elbow. The temperature should be about 100 degrees F. at first, and, as the weeks go by, permit the water to cool to about 98 degrees F., and then 95 degrees F. Wash the face while the body is covered, and always support the back of the baby with your left, or right arm. Nostrils and outside of ears are cleaned with match or toothpick wrapped with cotton. Never attempt to clean the interior of a baby's ears. Do not rub with a towel, but pat the skin until dry.

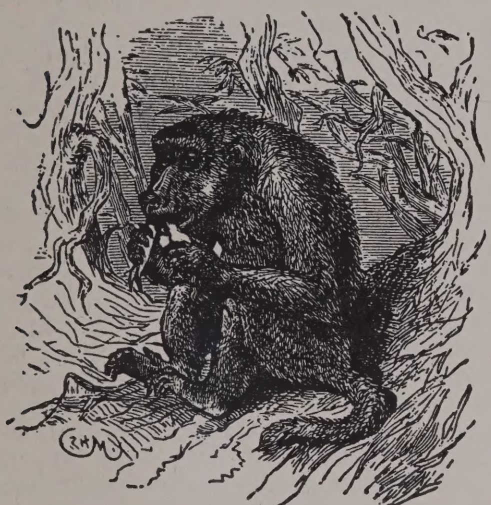
Holding, rocking, fondling, and teasing will make baby cross. Let it go to sleep without rocking. The more one handles baby the more nervous it becomes, and the less it grows. If one begins to pat and rock baby unnecessarily, it will form the habit of crying to be held, to its own detriment.

Baby begins to cut its teeth at about the seventh month, the central incisors appearing first. It attempts to sit up at about the sixteenth week, and is able to do so at about the fortieth week. It walks at about the fourteenth or fifteenth month.

The Binet-Simon mental test gives many suggestions regarding the mental development of children. In part, the following is presented as proper development of a normal child. At the age of eighteen months, a baby generally can say "mamma," "papa," and a very few simple words. At the beginning of the third year it will pick out objects in pictures and repeat short sentences. At four years it distinguishes sex and between long and short time. At five years it can repeat sentences of eight or ten words; and at six it can distinguish between morning and afternoon, and carry out commands involving two or three things.

See Food, Health and Growth, by Emmett Holt; *First Aid in Nursing Ailments*, by E L. Coolidge; *Nutrition and Growth in Children*, by William R. P. Emerson; *Care and Feeding of Infants and Children*, by Walter Reeve Ramsey; *Feeding, Diet and General Care of Children*, by Albert J. Ball.

Baboon (*băb-oon′*), a family of monkeys, native to Africa and found also in parts of Asia. They have dog-shaped heads, long muzzles, large cheek-pouches in which a great quantity of food can be temporarily stowed away, frequently large and brightly-colored calloused cushions on their hips. In the adult males the canine teeth are developed into formidable tusks. They are quadrupeds, running swiftly on all-fours, climbing with great vigor, fond of sitting on their haunch pads and especially at home in mountainous districts. They often live in herds, and, led by patriarchs and guarded by sentinels, fight other herds or defend themselves against other wild beasts. Often when fighting they will stand erect. They are playful and amiable when young. It is said the ancient Egyptians trained them to pick fruit. When older, especially when kept confined, they are very savage. Their food is largely made up of fruits, roots, seeds, insects, worms, etc. Their raids on plantations are much dreaded. About a dozen different kinds are known. The largest and fiercest is called the mandril or ribbed-nose baboon, and is a native of the Guinea coast. This form has a rudimentary tail, while the common baboon has a well developed tail, twenty inches long in the adult. The baboon is thought to have been an object of worship in Egypt, inspiring reverence because of his wise-looking face.


BABOON

Bab′ylon, capital of the empire of Babylonia on the Euphrates River, was said by the ignorant Greeks to have been founded by Queen Semiramis, who, it is related, employed two million workmen in building it. In Nebuchadnezzar's time, it stood on both sides of the river, in the form of a square. It was surrounded by walls, some 60 miles long, with 100 brazen gates. Here was a famous temple of Baal, by some thought to be built over the ruins of the tower of Babel; also the hanging gardens of Semiramis, one of the wonders of the old world. The Persians ruined Babylon by their conquest, Xerxes in particular, ravaging the temple of Baal. Alexander the Great undertook to rebuild the city; but when his ten thousand workmen, after two months' labor, had not even cleared away the rubbish, he gave up the project. After that it rapidly fell into ruin, and its materials were used in building the new city, Seleucia, by Alexander's successor, Seleucus.

Babylo′nia was the name given to the low plain watered by the lower streams of the Tigris and Euphrates. The country has always been one of the most fertile spots in western Asia. Herodotus tells us that it supplied one third of the corn of the whole Persian empire. This fertility was increased by a network of canals irrigating the whole country.

It has always been a land of many races and tongues, and almost every country is represented in the mixed gathering of nations living on its plains. Chronicles and lists of kings have been found that afford us considerable knowledge of the Babylonians. Boys became free citizens at the age of fourteen; women were well-treated; they could trade and own slaves, and offenses against the mother were severely punished. Slaves must not be treated cruelly, and all free Chaldæans must be educated and learn tablet-writing. Judges sat in the gates of the temple, and taxes were fixed by law. They were also no mean sculptors, and had learned the art of casting metals.

Babylonia's history in age rivals that of Egypt, going back at least 4,000 years before Christ. The first king who appears to have united the different towns into one kingdom was Urbaku (about 2,700 B. C.). In 2120 B. C., came in the Kassite dynasty, and then Babylon came to be known as the capital of the empire. From 1150 B. C. there were many wars between Babylonia and Assyria. Even the great kings suffered invasions from the north, as Nabonassar, who reigned fourteen years, beginning in 747 B. C., and whose kingdom was twice invaded by the Assyrian army. Tiglath-Pileser III, the Assyrian, completely overran the country, and ascended its throne as King Pul, being known by a different name in each of his kingdoms. This conquest brought Babylon and Nineveh, the two capitals, into close relations. Merodach-Baladan II succeeded, in 722 B C., in freeing the country from its northern neighbor, and by skillfully sending an embassy to Hezekiah of Judæa and other Syrian princes led them to revolt, and so kept the Assyrian Sargon too busy to march into Babylonia, but in 710 B. C. it was again conquered. When Assyria fell, Babylonia rose on its ruins as a conquering empire. Nebuchadrezzar, its greatest king, reigned forty-three years (604–561 B. C.), reconquered provinces, rebuilt temples and palaces, and made Babylon once more queen of nations. Among other conquests he captured Jerusalem, carrying its king, Jehoiachim, captive to Babylon, and eleven years later destroyed the Jews' capital and removed most of the people to Chaldæa. The last notable king was a usurper, Nabunaid, who drove out Nebuchadrezzar's grandson, and who left almost as many inscriptions on bricks, cylinders or tablets as the great Nebuchadrezzar himself. The whole land revolted against him because he neglected the duties of government and religion, leaving everything to his son, Belshazzar. This made the country an easy prey for the Persian conqueror Cyrus, who captured Babylon in 538 B. C. It was afterward ruled by Alexander, by the Syrians, Parthians, Romans, the caliphs of Baghdad and several dynasties of the Persians and the Turks.

Bacchus (*băk'kŭs*), one of the names among the Greeks, and the usual name among the Romans, for Dionysus, the god of wine. In Italy, he was connected with the god Liber. He was the son of Jupiter, and was brought up by the nymphs at Nysa in India. Many stories are told of his adventures. He flayed Damascus alive, who opposed him in Syria; made Lycurgus, king of the Edones, mad, so that he killed his own son, and when he became sane, caused him to be torn in pieces by horses; he also overcame the Amazons. Bacchus taught men to cultivate the vine and to make wine. He collected bands of worshipers, mainly women, and, surrounded by them, seated in a chariot drawn by panthers or leopards, passed through many countries. He was represented in some works of art as an infant, but generally by the Greeks as a beautiful boy, while in the east he was pictured as a man of middle age, clothed in long robes. Festivals in his honor were first held in Thrace, but the most famous were at Athens and were four in number; the country festival in December, when the vintage was just over; the wine-press festival in January, when the wine was just made and the presses cleaned; the flower festival in February, lasting three days; and the great festival in March, when the city was filled with strangers from all Greece. In these festivals, banquets, processions and plays composed the program, and they were scenes of riotous merriment and drunkenness. In Rome the Bacchanalia, as it was called, was celebrated every third year; but it became so immoral and dangerous that the consuls in 186 B. C. forbade its observance. After this, the Liberalia were celebrated yearly on the 16th of March, on which day the young men began to wear the *toga virilis*, the badge of manhood.

Bach (*băk*), **Johann Sebastian,** one of the greatest musicians of the world, was born at Eisenach, Germany, in March, 1685. He belonged to a distinguished musical family, and at Erfurt, where a branch of the family lived for many years, the town musicians were called Bachs, even when no member of the family was connected with them. Losing his father before he was ten years old, his older brother undertook his musical education, but found it hard to keep his genius in check. He tried to hide from him a manuscript volume of organ pieces, but Sebastian managed to get hold of it and worked for six months copying it by the light of the moon, for fear of being found out; but was discovered and his copy taken from him. At fifteen he entered the choir of St. Michael's school at Luneburg. Here he remained as a violinist after losing his beautiful voice. In 1703 he was given a court appointment at Weimar, and in 1704 became organist at Arnstadt, where he composed many of his church cantatas. During the nine years spent as court organist at Weimar, he studied Italian music and did some composing. Some years followed at the court of Prince Leopold, where he wrote the first half of the collection known as *Forty-eight Preludes and Fugues.* His next appointment was at Leipsic, where all his greatest works for chorus were written. In 1747 he paid a visit to Frederick the Great at Potsdam, who received him with great honor. On a theme proposed by the king, Bach composed his *Musical Offering*, which, with his *Art of Fugue*, is a work of wonderful ingenuity and learning. An operation on his eyes resulted in total blindness. He died July 28, 1750. Piano-players owe to Bach the method of tuning, by which they can play in all keys, and also the mode of fingering which brings all the fingers into use.

Bache (*băch*), **Alexander Dallas,** a noted American scientist. He was a great-grandson of Benjamin Franklin, and was born at Philadelphia in 1806. He graduated with high honors at West Point, where he was made an instructor. He was professor of natural philosophy and chemistry in the University of Pennsylvania, at Philadelphia, and later president of Girard College at the same place. He organized a system of free schools in Philadelphia. He was superintendent of the United States coast survey and regent of the Smithsonian institution. He was prominent in scientific circles, and was connected with many scientific societies in both hemispheres. He died at Newport, Rhode Island, February 17, 1867.

Bacil'lus (*bȧ-sĭl'lŭs*), a genus of the plants known as *Bacteria*, and distinguished from the other forms by consisting of rather elongated rod-shaped cells. See BACTERIA.

Bacon, Sir Francis, an English statesman and philosopher, and one of the most extraordinary men of all time. A scholar, a wit, a lawyer, as well as a statesman and philosopher, his writings will endure as long as the language in which they are written. He was born in London, January 22, 1561. He was sent to the University of Cambridge at the age of twelve. Before he was sixteen he wrote a paper against the philosophy of Aristotle, and at nineteen a work called *On the State of Europe,* the result of his studies while a member of the suite of the English ambassador at Paris. He was knighted in 1603, and appointed consul to the crown. In 1613 he became attorney-general. In 1617 he was made keeper of the great seal, and in 1618 appointed lord chancellor, with the title of Lord Verulam, and soon after was created Viscount St. Albans. His fall was as sudden as his rise was rapid. He was accused of bribery and convicted on his own confession. He was fined £1,000,000 ($200,000) and imprisoned in the Tower. Although the fine was remitted and the imprisonment lasted but two days, shame, added to failing health, kept him from appearing again at court. His death on April 9, 1626, was caused by a cold taken while making an experiment to test the power of snow to preserve flesh. Bacon's writings are numerous, but he is known best by his philosophical works, *Advancement of Learning* and *Novum Organum,* which introduced a new method into philosophy. "He rang the bell which called the other wits together," is his own description of the effect of these writings. The most popular of his works is his *Essays,* fifty-eight in number, on such subjects as *Pride, Truth, Ambition, Riches,* which well repay study both of their contents and style.

Bacon, Leonard, the son of a missonary to the Indians, was born at Detroit, Michigan, in 1802. He was educated at Yale College and Andover Theological Seminary. He became a Congregational pastor at New Haven, a post he held for many years. In 1866 he became professor of theology at Yale Divinity School and, later, lecturer on church history. He was a prominent contributor to the *Christian Spectator* and the *New Englander,* and for several years one of the editors of the *New York Independent.* He also published a number of works. He died at New Haven, Connecticut, December 24, 1881.

Bacon, Nathaniel, a colonial leader, of English birth, the chief figure in Bacon's Rebellion, in Virginia, under the governorship of Sir Wm. Berkeley. He was born in Suffolk, England, January 2, 1647. He was educated at the London Inns of Court as a lawyer. A short time later he removed to Virginia, settled on the upper James River, and became a member of the governor's council. The colonists of the region were then harassed by the Indians, and being dissatisfied with Governor Berkeley's measures for the defense of the colony, they chose Bacon as their leader in the Indian war. Berkeley, however, proclaimed the expedition a treasonable one, and captured and tried Bacon; but he was acquitted by the council and reinstated as a member of the body. Bacon meanwhile opposed the governor's authority in other ways, and especially his arbitrary and unjust taxation of the colonists, his inefficient Indian policy; and his measures of restricted suffrage. The Indians again invading the colony, Bacon once more set out to subdue them. This he did, but had also to fight the governor and his forces, who once more had proclaimed Bacon a rebel In the struggle, Jamestown, the capital of the colony was taken by Bacon and burned, the governor's forces being routed, while Berkeley himself had to take refuge on an English ship in the river. At this juncture Bacon, however, died, and the war (styled Bacon's Rebellion) came to an end. Its influence on the subsequent American Revolution can be traced.

Bacon, Roger, an English monk and scientist, was born about 1214. He studied at Oxford and Paris, became a Franciscan monk about 1250, and devoted himself to science. He made discoveries that ignorant people considered magic. Because of the accusations made against him, he was imprisoned for twenty years, with one brief space of freedom. He wrote a Latin book, called *Opus Majus,* giving a comprehensive view of the progress of human knowledge. His works were all written in Latin. He invented or improved the telescope. As a scientific discoverer he was centuries ahead of his age.

Bacteria (*băk-tē′rĭ-ȧ*), an immense group of extremely small living vegetable organisms. Bacteria is the plural of *bacterium,* a diminutive form of the Greek word *baktron* meaning "staff" or "rod." These organisms were first observed in 1683 by Antony van Leeuwenhoek, a Dutch lens grinder. He reported his findings to the Royal Society of London. The discovery of two additional genera, *Monas* and *Vibrio,* was announced in 1773 by O. F. Müller. In 1883 there was concrete evidence of progress in the study of bacteria when Ehrenberg and Dujardin began an investigation of these small organisms. It was not until 1853, however, that the prevalent belief that all bacteria was animal in nature was displaced and Harvey's law, "*Omne vivum ex vivo*" ("All life comes from life") universally accepted. This success was due primarily to Cohn who conducted priceless investigations on bacteria from 1853 to 1872. His conclusions were confirmed in 1857 by Nägeli, who classified bacteria in a class parallel to that of algæ—the class of fungi. Koch, in 1876, procured a pure culture of the anthrax bacillus. Since that date, down through the discoveries of Behring and Kitazato in 1890 concerning antitoxic action of serum of animals immunized against tetanus toxin, and those of Pfeiffer in 1894, bacteriology has become an increasingly important study with reference to agriculture, hygiene, manufacturing, public health and society in general.

Even to-day, the popular mind associates bacteria with animals, chiefly because they are mostly ciliated and have powers of locomotion. The Greek word *baktron* is oftentimes misleading in that bacteria do not always have the shape of a rod or stick. There are three classes of bacteria, grouped according to shape: *cocci* or minute spherical cells; *bacilli*, rod-shaped cells; and *spirilli*, spiral filaments. These three classes have many subdivisions. They are the smallest known of living organisms, the adult bodies of which are sometimes barely visible under the highest powers of the microscope. They multiply by division with wonderful rapidity and occur in the air, in the water, in the soil, and in the bodies of plants and animals. Some of them are exceedingly dangerous. They are the agents of the processes known as fermentation and decay, inducing fruit juices, milk, etc. to sour, and also pus to form in connection with wounds and decay. A large group of bacteria are pathogenic, that is, they give rise to certain diseases in man and animals as well as in plants. As producers of disease, bacteria are known by various names, as bacilli, microbes, germs, etc. They are the causes of such human contagious diseases as tuberculosis, cholera, diphtheria, and typhoid fever, and of pear-blight and melon-wilt among plants. Many species of bacteria are active agents in converting dead, organic, matter into soluble food material for plants. Other species oxidize nitrites in nitrates and still another group fix atmospheric nitrogen. Thousands of these organisms may be found in a single drop of water since they are so minute that they rarely exceed a micromillimeter in breadth.

Just as bacteria are divided into three groups according to shape, so are they divided into two groups according to what they live on. That group living on dead animal or vegetable matter are termed *saphrophytes*, while those thriving on living animal or vegetable matter are known as *parasites*. This distinction is most important in that the former, by decomposing dead animals and plants into their constituent elements, provide food for plant life, while the latter, by consuming live animals or plants, destroy life and it is this group to which all harmful bacteria belong.

See BACILLUS; DIPHTHERIA; MEDICINE; SERUM.

Baden (*bä'dĕn*), **The Republic of,** lies in the southwestern corner of the German empire, separated from Switzerland by the Rhine. It extends over an area of 5,819 miles. It is divided into a plain and highlands, and of the latter the Black Forest is the most important part. It is drained by the Rhine and Danube, and so pours its waters into two opposite seas. The country is fertile, especially the Rhine valley, and rich in minerals. It is famous for its mineral springs. Among its manufactures the wooden clocks and straw plaitings of the Black Forest are known the world over; of clocks alone over seventy thousand are made yearly. The manufactures of jewelry at Pforzheim are the most important in Germany. Baden has a good school system, a Protestant university at Heidelberg and a Catholic university at Freiburg.

The earliest people of Baden were the Alemanni, and the ducal house of Baden began in the eleventh century. During the French Revolution, the spirit of change which was abroad in all Germany passed into Baden. The Grand Duke Leopold was driven out, but was restored to his throne by the aid of the Prussians. In 1867 although Baden had allied with Austria against Prussia, it was forced to enter the North German Confederation. The troops of Baden fought with distinction in the Franco-Prussian War, and the Grand Duchy became a part of the restored German empire. The last grand duke, Frederick II, came to the throne in 1907. Baden, like the other states of the German empire, expelled its sovereign in 1918 and became a republic. Karlsruhe, with a population in 1925 of 145,694, is the capital; but Mannheim, with a population of 247,486, is the chief town and one of the busiest ports on the upper Rhine. The population of the entire republic is 2,312,462, of which the majority are Catholics.

See GERMANY.

Baden-Baden, a town and an internationally famous summer resort, is situated in the republic of Baden. It lies on the edge of the Black Forest. Its hot springs, which attract many strangers, were known in the time of the Romans, Baden-Baden claiming to have been founded by Hadrian in the second century. In laying the foundations of the summer home of the grand duke, the remains of a vapor bath and a dungeon of that period were found. There are thirteen hot springs, with a temperature ranging from 115° to 150°. The chief spring discharges in twenty-four hours about 4,200 cubic feet of water. The water of these springs is of inestimable value in the treatment of skin diseases, gout and rheumatism. The attraction of Baden-Baden used to be its gaming tables, once the most famous in Europe. To-day they are closed. Besides paying a rent of $70,000, as large a sum was devoted to adorning the promenades and public gardens. The scenery is beautiful. The picturesque ruins of the old castle still crown the summit of the Schlossberg, from which is had a fine view of the Rhine valley. The population of Baden-Baden, according to the latest census of 1925, is 25,692.

Baden-Powell, Robert Stephenson Smyth, (first Baron of Gilwell), a distinguished British soldier, was born on February 22, 1857, the son of the late Rev. Baden-Powell of Oxford. He was educated at Charterhouse, London. In 1876 he joined the 13th English Hussars, and served as adjutant of that regiment in India, Afghanistan and South Africa. In 1887-89 he served in South Africa as assistant military secretary on the staff and took part in the operations in Zululand, for which he was mentioned in dispatches. He was employed for a time in Malta, and in the command of the native levies in the war in Ashanti (for which he received a star and was raised to the rank of lieutenant-colonel). In the Matabele War, he was chief staff officer in that campaign. In the Boer War, he was given command of the 5th Dragoon Guards, and with a force of 1,200 men was besieged in Mafeking, on the Bechuanaland frontier, from October, 1899 until the town was relieved on May 18, 1900. The general displayed great tact and coolness in the conduct of the defense. He afterward took part in the advance on Pretoria, and was given command of the South African police for the pacification of the country. He later served as British Inspector-General of Cavalry.

In 1908 he founded The Boy Scouts, an organization which has since spread throughout the world. In 1911, together with his sister Miss Agnes Baden-Powell, he established the Girl Guides.

He is the author of *Reconnoissance and Scouting; Vidette Duty; Cavalry instruction; The Downfall of Prempeh; The Matabele Campaign,* and *Pig-Sticking or Hog-Hunting.* See Boy Scouts.

Badger (*băj'ĕr*), a burrowing animal common in Europe, Asia and America. It is notable for the flatness of its short, clumsy body. Its head is pointed at the snout, its feet armed with long claws, used for digging and also for defense. All badgers have heavy fur marked very distinctly especially with a white mark on the head. They are creatures of great strength and courage and wonderful acuteness. Left alone, they are timid and gentle. They live in burrows dug by themselves, are very shy about being seen and usually come forth only at night. The fur is valuable, the hairs used in making artists' brushes. The European badger, unlike the American, is fond of deep woods. Badger-baiting, a low sport once practised in England, had to do with the arraying of one badger's strength against that of a number of dogs; from this comes the word "badgering," meaning persistent annoying. In Scotland the badger is sometimes domesticated. The American badger belongs to the west, and shows a fondness for open prairie. He is about two feet long, his color greyish with irregular black bands on the back, underneath whitish, throat and sides of the face white, in front of each eye a black patch, legs and feet black. The markings of the face remind one of a clown. With his strong claws he lays open the burrows of prairie dogs, ground squirrels, gophers, field-mice, etc. He feeds on these and on birds, frogs, small snakes, lizards, grasshoppers and other insects. He very seldom shows himself; if ever caught a distance from home will flatten himself "almost like a doormat of a turtle. His long, silky, grey hairs, parted in the middle down along his spine, spread out into the grass on each side, so that he seems to be only a slight hummock in the prairie." The Sand Badger of Balisour is native to northwestern India and Assam. It closely resembles a small bear. It is a yellowish animal and quite a bit larger than either the European or American badger.

Baer, Karl Ernst von (*fōn bâr*), a distinguished Russian naturalist, the founder of modern embryology, was born in Estonia in 1792. He was educated in Germany and became a professor in the University at Königsberg, where, in 1828, he published *The Development of Animals* (*Entwickelungsgeschichte der Tiere*), a set of careful observations and philosophical reflections that are most remarkable for clearness and thoroughness. This book made an epoch in the science of the development of animal life.

Baffin's Bay, a gulf on the northeast coast of North America lying between Greenland and the great islands northeast of Hudson Bay. It is open to the Atlantic Ocean by Davis Strait, and to the Arctic Ocean by Smith Sound and Lancaster Sound. It is about 800 miles long, and on an average 200 miles in width. The shores are for the most part lofty and steep, and backed by snow-clad mountains. Baffin's Bay was discovered in 1562, but was named from William Baffin, who as pilot of an expedition in 1615 first explored it. It is navigable for only about four months in the summer, because of the ice. Whaling and seafishing are carried on in its waters.

Bagdad or **Baghdad** (bȧg-däd' or băg'dăd), the capital of Iraq (formerly Mesopotamia) in Asia, lies in the province or vilayet of the same name, which is situated between Persia and Arabia. The Tigris flows through Bagdad, and pontoon bridges connect the modern town on the eastern bank and the old town on the western. The city is surrounded by a brick wall five miles in circumference, and forty feet high, which is pierced by four gates. It dates back to the time of Nebuchednezzar and was long famous as the home of the caliphs and one of the most gorgeous cities of the Mohammedan world. Many ruined mosques, the bright domes and minarets of which gleam through the palm trees as the traveller approaches Bagdad, are proof of its former glory. At present it is picturesque, but low uninviting houses line the narrow, crooked, dirty streets. Many of the interiors, however, are rich in vaulted ceilings, massive gildings, and inlaid mirrors, and the courts often have fountains. Tombs in the vicinity are visited annually by thousands of pilgrims. The most important of the public buildings are the palace of the Governor-General, the citadel, and the many khans.

During the rainless summer the heat is enervating and the entire population sleeps on the housetops. Rain falls for only twenty or thirty days in the year, but when the snows melt on the hills of Armenia, the Tigris is filled and often floods the country, as it did in 1831, when a flood destroyed several thousand people and laid waste half of Bagdad. The city is sometimes visited by cholera, which in 1830 killed 4,000 people daily when at its height. The opening of the Suez canal lessened the trade from India, and the deflection of the Persian trade to routes through Trebizond on the north and the Persian Gulf on the south further depreciated Bagdad activity. The city is still commercially important, however, especially as railway and air facilities have been developed. The chief exports are red and yellow leather, silk and cotton goods, dates, wool, grain, timbac (tobacco substitute), horses, skins, feathers, and gum tragocanth.

In 762 Abbassid Caliph Mansur built Bagdad on the site of an ancient Babylonian city of similar name. Harun-al-Rashid (*hä-rōōn-är-rȧ-shēd'*) greatly improved it in the next century, and made it the seat of Arabic learning and literature. During his rule and that of his successor it became the prosperous, splendid city of *Arabian Nights*. For long after, it was one of the most magnificent cities in the world. In 1258 the Abbassid Caliphate was terminated by Hulaku, grandson of Genghis Khan, whose descendants were expelled in their turn when Timur captured Bagdad in 1393. Shah Ismail of Persia conquered the city early in the sixteenth century, and for more than a hundred years, Turks and Persians fought to possess it. In 1638 it was annexed to Turkey. In the World War, it was the base of Turkish warfare in Persia and Iraq. The British captured it on March 11, 1917.

At one time the population of the city was estimated to be 2,000,000, but the census of 1920 states a total of only 250,000 consisting of Turks, Arabs, Christian Jews, Armenians, Hindus, Afghans and Persians. In 1930 the population was estimated at 300,000. The province or vilayet of Bagdad includes the greater part of the basin of the lower Tigris and Euphrates, and covers an area of 113,876 square miles. In 1920, it had a population of 1,360,304.

See Iraq.

Bagehot (*băg'ŭt* or *băj'ŭt*), **Walter,** a noted English economic writer and *littérateur*, was born at Langport, Somersetshire, February 3, 1826. He was educated at the University of London from which he graduated in 1848. He studied law, and was called to the English bar. Instead, however, of following the profession of law, he joined his father in banking, and was soon recognised as an authority in finance, and widely known as an accomplished writer and critic. From 1854 to 1863 he was one of the editors of the *National Review,* to which he contributed many able papers on literary, biographical and theological subjects. At the *Review's* decease he wrote for *The Fortnightly,* and between the years 1860 and 1877 was editor of *The Economist.* He published a number of widely-known books, among which are a textbook on *The English Constitution; Lombard Street,* a description of the money market; *Physics and Politics,* "a work which does for human society what the *Origin of Species* does for organic life," and three volumes entitled respectively, *Literary Studies; Economic Studies,* and *Biographical Studies.* The latter was not published until after Bagehot's death.

Bagpipe (*băg'pīp*), a wind instrument common in the Highlands of Scotland, and in use in some other countries as well. It is a large bag made of leather, usually covered with cloth, having a valved mouth tube by which the player fills the bag with his breath. There is a reed chanter, similar to a German flute, with finger-holes upon which the melody is played, and three other pipes, called drones, each of which constantly sounds a single low tone. Sometimes a bellows is used instead of the piper's breath to blow up the bag.

The instrument has a range of but nine notes, from "G" in the treble clef to "A" above it. Its seemingly limited range goes unnoticed, however, when the piper tucks the leathern bag under his arm, throws the drones over his left shoulder, holds the chanter in his fingers, places the blowpipe to his lips, and fills the hall of merrymakers with the "skirls" and "drones" of his instrument. At each festival, marriage and funeral in Scotland, the piper makes his appearance playing the lively Scottish reels or the slow and impressive marches. It is the national instrument of the Scottish Highlanders, pipers being attached to their regiments and usually present at their festivals. The thrilling siege of Lucknow during the Indian Mutiny of 1857-58 has been immortalized by Whittier in his poem, *The Pipes of Lucknow:*

> "Pipes of the misty moorlands,
> Voice of the glens and hills;
> The droning of the torrents,
> The treble of the rills! . . .
> "Dear to the Lowland reaper,
> And plaided mountaineer,—
> To the cottage and the castle
> The Scottish pipes are dear;—
> "Sweet sounds the ancient pibroch
> O'er mountain, loch, and glade;
> But the sweetest of all music
> The pipes at Lucknow played."

To-day there are many who erroneously believe that the bagpipe originated in Scotland. The bagpipe is a very ancient instrument. It is spoken of in the Old Testament, and was used by the Egyptians, Greeks and Romans. Although it has survived in Scotland down to the present day, one must not necessarily conclude that Scotland alone boasts of its bagpipes. In the Tyrol, in Ireland, Italy and Catalan bagpipe notes are heard, although the Irish and Italian bagpipes are ruder instruments than the bagpipes of the Scottish Highlands.

See Havelock, Sir Henry; Lucknow; Scotland.

Bahamas (*bȧ-hā'mȧz*), a chain of islands belonging to Great Britain, stretching nearly six hundred miles in a northwesterly direction from Haiti to Florida. There are twenty-nine islands, twenty of which are inhabited; 661 islets and 2,387 reefs, which occupy an area of 4,404 square miles. Many woods and valuable fruits grow there, and the main trade is in oranges, pineapples, salt and sponges. The

Bahamas were the first land discovered by Columbus, but the exact spot of his landing in 1492 is doubtful. Cat Island, and Watling's Island or San Salvador, each claim the honor. Nassau is the capital. The constitution calls for a governor, an executive council of nine, a legislative council of nine, and a representative assembly of twenty-nine. The total population in 1931 was 59,828.

Bahia (*bä-ē'ä*) or **Sao** (*São*) **Salvador,** the capital of the state of Bahia in Brazil, and the second city in the Republic. It lies on the east shore of the Bay of All Saints, one of the finest bays in America. It is built partly on the shore and partly on high ground, and the two parts of the city are connected by steps and a hydraulic elevator. It has a university, exchange, arsenal, a national dockyard, more than sixty churches and many other public institutions. It has a railroad to the interior and connection with several cities by submarine telegraph. Its principal exports are sugar, coffee, rice, cocoanuts, cotton, dyestuffs, fancy woods, and diamonds. Bahia is the oldest city in Brazil. The bay was discovered in 1503 by Amerigo Vespucci, and the city was founded by a Portuguese navigator, Correa, in 1510. It is visited annually by yellow fever and other epidemics. According to the estimate of 1929 the population of Bahia was 329,898. The population of the state of Bahia, which covers an area of 164,601 square miles, was 4,135,894.

See Brazil.

Baikal (*bī-käl'*), **Lake,** the largest and deepest fresh-water lake on the continent of Asia, lies north of Mongolia and the Altai Mountains. It is situated in the Department of Irkutsk, in latitudes 51° to 55° North; longitudes 103° to 110° East. It is fed by numerous streams from the Baikal Mountains, a spur of the Altai Range. It has several outlets, the chief being the Angara River, a confluent of the Yenisei. The Trans-Siberian Railway which connects Leningrad via Manchukuo with the ports of Vladivostok, Dalny and Port Arthur on the Pacific, formerly crossed Lake Baikal, the trains being transported across the lake on an ice-breaking ferry-boat. The area of the lake, which is crescent-shaped, is estimated at 13,200 square miles. Its greatest depth is 5,400 feet, and the average depth is 820 feet. The short line is 1,220 miles in length. Lake Baikal abounds in fish, including salmon, sturgeon and fresh-water seals. Steamboats have of recent years begun to develop trade on the shores of the lake, which are rich in mineral springs and petroleum wells. The region is subject to earthquakes.

Bainbridge, Commodore William, an American naval officer, was born at Princeton, New Jersey, on May 7, 1774. His career as a naval commander dates from 1798, when the United States navy was recognized. Early in the century he was actively engaged in the Mediterranean in successive command of the frigates *George Washington, Essex,* and *Philadelphia.* He was once captured by the French, and had to surrender his ship in the United States war with Tripoli. When the War of 1812 broke out he was given command of a squadron, consisting of the *Constitution, Essex,* and *Hornet,* which sailed from Boston in that year. When cruising off the coast of Brazil toward the close of 1812, he captured the British frigate, *Java,* of forty-nine guns. Congress voted him a gold medal, together with a share in the prize money, for his staunch and loyal service. During the remaining months of the war he had charge of the Charlestown Navy Yard. From 1815 to 1821 he was again in command of a squadron at sea. At a later date, Commodore Bainbridge acted as president of the board of navy commissioners. He died at Philadelphia on July 28, 1833.

Baird, Spencer Fullerton, a noted American naturalist, was born at Reading, Pennsylvania, on February 3, 1823. He was educated at Dickinson College, Carlisle, and became professor of natural science there in 1864. In 1850, he became secretary of the Smithsonian Institute, at Washington, D. C., and in 1871, was appointed United States Commissioner of Fish and Fisheries. Under his direction, the National Museum was begun in 1850. He is the author of many papers on natural history, and in connection with other editors published *The Birds of North America; The Mammals of North America,* and a *History of the Birds of North America,* in five volumes. He died at Wood's Hole, Massachusetts, on August 19, 1887.

Baker, Edward Dickinson, a distinguished American senator and soldier, was born in London in 1811. At the age of three, his parents brought him to the United States, living first at Philadelphia and then at Belleville, Illinois. He practised law in Springfield, Illinois, and was elected to the legislature, state senate and finally to the house of representatives. In 1846 he resigned his seat in Congress to become colonel of a regiment of volunteers from Illinois in the Mexican War. He was present at the siege of Vera Cruz, and commanded a brigade at Cerro Gordo. He was elected to the United States senate from Oregon in 1860. At the breaking out of the Civil War he was appointed colonel of a regiment he had raised in New York and Philadelphia. He was killed when in command of a brigade at the battle of Ball's Bluff, October 21, 1861.

Baker, Newton Diehl, a prominent American jurist and public official, was born in Martinsburg, West Virginia, on December 3, 1871. He was educated at Johns Hopkins University, from which he was graduated in 1892, and at Washington and Lee University, where he obtained his LL.D. in 1894. In 1896 he became secretary to Postmaster-General Wilson and in 1897 he began the practice at law in Martinsburg. Five years later he became City Solicitor in Cleveland, Ohio. He occupied that position until 1912 when he was elected Mayor of that city. In 1914 he was re-elected to this position. In 1916 he was appointed Secretary of War by

President Woodrow Wilson. He acted in this capacity throughout the World War and at all times his keen ability and devotion to the requirements of his office was clearly recognized by his Government and an admiring though anxious public. On March 4, 1921, Newton D. Baker was commissioned Colonel of the Officers' Reserve Corps.

For the next seven years, Newton D. Baker engaged in the practice of law in Cleveland, a senior member of a law firm in that city. In June, 1928, upon the death of Oscar S. Strauss, he was appointed fourth member of the American panel of judges of the Permanent Court of Arbitration at The Hague, by President Coolidge. In March, 1929, he was awarded the Distinguished Service Medal for his services during the World War. In May of that same year he became a member of President Hoover's Law Enforcement Commission. He also served as a Chairman of the Committee for Welfare and Relief Mobilization.

Baker, Ray Stannard, an American author and journalist, was born at Lansing, Michigan, in 1870. He was educated at the Michigan Agricultural College, graduating in 1889, and at the University of Michigan. In 1892 he became a reporter on the Chicago *Record,* and later became sub-editor of that publication. From 1897-8 he was managing editor of *McClure's Syndicate,* and in 1899 became associate editor of *McClure's Magazine.* From 1906 to 1915 he was an owner and editor of the *American Magazine.* During the World War he served as special commissioner of the United States Department of State in Great Britain, France, and Italy. Soon after the close of the war, in 1919, he became director of the Press Bureau of the American peace delegation in Paris.

Under the pseudonym of "David Grayson," he wrote *Adventures in Contentment* (1907); *Adventures in Friendship* (1910); *The Friendly Road* (1913); *Great Possessions* (1917); *Adventures in Understanding* (1925); and *Adventures in Solitude* (1931). Among those works written under his own name are: *What Wilson Did at Paris* (1919); *The New Industrial Unrest* (1920); and *Woodrow Wilson and World Settlement,* 3 vols. (1922). In 1926, together with Professor William E. Dodd, he edited the *Public Papers of Woodrow Wilson,* a work of six volumes.

Bakersfield (*bāk'ẽrz-fēld*), a city and the seat of Kern County, California, is situated on the Kern River, about one hundred and sixty miles from Los Angeles. It is the center of the California oil industry and a thriving rice, fruit-growing and ranch region. Electric power, which is generated by the Kern River, is employed in the majority of industries. Valuable mineral deposits of copper, gypsum, tungsten, and gold lie in the immediate vicinity of the city. In 1909 a section of Kern City was annexed to the city of Bakersfield. According to the census of 1930 the population is 26,015.

Baking Powder, a combination chemically prepared of tartaric acid, bicarbonate of soda, and acid calcium phosphate, which is used as a substitute for yeast. When mixed with flour, it is used in the making of bread, biscuits, cakes, etc. The powder, when water is added, creates carbonic gas which causes the bread to rise, as in the olden method of making bread by the fermenting of yeast. Some bakers substitute the bicarbonate of ammonia for that of soda, which is unobjectionable. The use of alum in place of tartaric acid is objectionable, however, if one desires wholesome bread.

Baku (*bȧ-kōō'*), an important city, and seaport, and capital of the Azerbaijan Socialist Soviet Republic, is situated on the western coast of the Caspian Sea. Baku is southeast of Tiflis and northeast of the rivers Kur and Aras, extending over an area of about 15,061 square miles. From 1509 to 1723 it belonged to Persia. In the latter year it was captured by Russia and for twelve years remained under Russian control. In 1735, however, it was restored to Persia, but came under Russian domination again in 1806. The population remained largely Tartar and Armenian rather than Russian.

There is an excellent harbor at the port of Baku which is of special importance to Soviet Russia as a naval station on the Caspian Sea. It is utilized as shipbuilding yards as well as a port for the shipment of petroleum, the chief product of this region. Situated just north of the port is the great oil-well emporium and refineries, known as the Black Town. Here, besides the crude oil works, are a number of chemical works, mills and tobacco factories. Much of the trade of Persia, which passes into Soviet Russia and western Europe, the cotton, silks, wines, rice, walnut wood and dried fruit exchange for manufactured goods, go through the port of Baku.

The Baku oil regions have been electrified in recent years and to-day are connected with the city of Baku and generally with the workers' settlements which have been constructed and modelled after an American type. It has been estimated that about 46,700 men are employed in Baku's oil industry, the principal source of Soviet Russia's oil supply. Under the supervision of the Soviet Government and the Five Year Plan, Baku has become a well-developed industrial city. In 1926, the last official census of the Soviet Union, the population of Baku, with its industrial districts, was 575,200.

See AZERBAIJAN; RUSSIA.

Balaam (*bā'lȧm*), a Midianite, a prophet, the son of Peor, who was induced by Balak, King of Moab, to curse the children of Israel when the latter were encamped in the land of Moab on their way to the promised land. When King Balak summoned him a second time, Balaam left his home at Pethor. As he travelled along the road on an ass, an angel of the Lord appeared. The apparition, which Balaam did not see, terrified the ass. Balaam struck the beast three times and the ass "spake with a man's voice and stayed the madness of the prophet." Although Balaam made three attempts to pronounce the curse desired by Balak, he was each time constrained by the Lord to bless instead of curse. Balaam was afterward killed by the Israelites in a war with the Midianites. See *Numbers* xxii-xxiv, and also xxxi.

Balaklava (*bă-lă-klä'vȧ*), a small fishing port in the Crimea, an autonomous republic of the Russian Socialist Federal Soviet Republics. It is situated eight miles southeast of Sebastopol. The British made it their headquarters during the Crimean War. A Russian attack on October 25, 1854, was repulsed. A famous incident, however, was the charge of the light brigade, so dramatically celebrated by Alfred Tennyson in his poem by that name. Lord Cardigan, obeying a probably mistaken command, led his light brigade of 600 men straight "into the jaws of death." With great bravery the men cut their way to the Russian guns, and the remnant cut their way back. Only 150 men survived the brilliant but futile charge. The discipline and courage of the soldiers is tellingly portrayed in the poem with its stirring rhythm. The English left the town in 1856. See CRIMEA.

Balance of Power, international equilibrium; the delicate adjustment of power among sovereign states so that no one state is in a position to be overbearing and aggressive, or imperil the independence of any one of the others. The doctrine was prevalent among the states of ancient Greece, but it did not become a prominent international factor until after the Thirty Years' War, caused by the steadily growing power of the Emperor Charles V, which menaced the independence of Europe. The peace of Westphalia in 1648 accorded it triumphant recognition. One of the causes of the downfall of Napoleon was the fear that his greatness was a peril to the rest of the world. Russia has long been watched as able to disturb greatly the balance of power in Europe. This kept her out of Constantinople, and accounted for the relief of the world at her defeat in the Russo-Japanese War. The World War resulted directly, although not wholly, from the fact that Germany threatened the balance of power in Europe, which also accounts for her punishment at the hands of the League of Nations.

At present, the doctrine is a paramount factor in Europe, where the Balkan states have long served to maintain an equilibrium, and the ambitions of Italy and Germany are a matter of world concern. It is also a paramount factor in the affairs of Asia, where the encroachments of Japan led China to seek help to preserve a balance of power; where Russia and Japan are observing a policy of patience, awaiting the struggle that seems inevitable, and in which Great Britain, in particular, among other nations has the deepest concern. Balance of power is thus most greatly perilled today by Italy and Germany in Europe and by Japan in the Far East. The Far Eastern question is the most critical.

Since the close of the World War, every treaty concluded has shown the effects of the endeavor to preserve a balance of power. Disarmament efforts have been blocked by this doctrine, and naval ratios deeply influenced by it. The theory of a balance of power is in direct opposition to that of a world power, which ambitious nations hold. The United States adheres to the doctrine of a balance of power for all European affairs, but it will permit no European nation to interfere in the affairs of an independent state of America.

Balance of Trade, a doctrine originally based on the "mercantile theory" of the net value of precious metals shipped into and out of a country, especially that more gold should flow into a country than out of it. From this premise there developed the prevailing principle of a balance of trade, that the total exports of a country should exceed its imports to secure a favorable balance, or the national wealth would decrease. It is very difficult to measure export and import values with scientific accuracy; yet efforts are made to secure this balance by import duties and restrictions and by encouraging home production and exports.

It is now known that it is not necessary to maintain steadily a ratio of exports exceeding or even equalling the value of imports. A country may for a period of time import greatly in excess of her exports, and still not decrease her national wealth but increase it. Such was the case with Great Britain for some years recently, when her imports steadily exceeded her exports and yet her national wealth gave signs of increase.

Soviet Russia, like the United States, has been accustomed to maintaining a substantial balance of trade. During the period of the first Five-Year Plan, the Soviet Government made every attempt to avoid an unfavorable balance of trade. Everything possible was exported out of the country, even to the point of depriving the inhabitants of food and clothing. Imports, however, were carefully selected for the purpose of developing her vast natural resources, many of them untouched. Raw materials, machinery, equipment for erecting and operating manufacturing plants, for building railways, were the principal imports.

To-day the Soviet Government has won recognition from several world powers and although the principle of maintaining a favorable balance of trade is not carried out exactly with each individual country with which trade relations are established, an ultimate balance of exports and imports must be maintained by the Soviet Government. In order to increase her exports and secure more advantageous trade treaties, it became a matter of paramount importance to Soviet Russia to be recognized and approved by the countries offering the best markets.

Basically, then, the principle of excess of exports over imports does secure a favorable trade balance, but it can be reserved over a period of time with no harm and even positive gain to a country, the present being sacrificed to the necessity of the future, as with Russia.

Germany's trade balance was maintained heroically until recent years. In 1932 her imports were valued at 4,667,000,000 gold marks; her exports at 5,739,000,000. In the months of January and February alone, however, there was in 1934 an increase over 1933, amounting to 44,000,000 reichsmarks in imports; and a decrease in the same months of 71,000,000 reichsmarks in exports. This created her first unfavorable trade balance in five years.

Since 1928, France has maintained an unfavorable trade balance. Her imports in 1932 were valued at 29,825,800,000 francs; her exports at 19,693,200,000 francs. The imports of Great Britain for 1932 were provisionally totalled at £703,132,725; and her exports at £416,051,378.

The United States has an interesting trade history which shows what can be done to create and maintain a favorable trade balance. Until the tariff act of 1842 her imports exceeded her exports. The average excess of imports under the 1833 act was $17,576,485. The act of August 30, 1842, swung the balance to an excess of $18,589,648 in exports. That balance has been maintained steadily since, although it has varied greatly, from the annual average of $2,830,198 excess of exports under the act of June 30, 1864, to $270,711,238 under the act of June 18, 1930. Total exports for 1932 were valued at $1,611,016,000; total imports at $1,322,774,000; an excess of exports mounting to $288,242,000.

Balboa (*bäl-bō'ä*), **Vasco Nuñez de,** a Spanish adventurer and conqueror, was born of a noble but poor family at Xeres-de-las-Caballeros, in 1475. In 1501 he joined the mercantile expedition of Rodrigo de Bastidas to the west. Later he began farming in Santo Domingo, but fell into debt and to escape his creditors smuggled himself on board a ship and joined an expedition under Francisco de Enciso to Darien in 1510. An insurrection which took place there gave him the chief place in the new colony. Rumors reached him here of a great western ocean, and in 1513 he set out in search of it. On September 25, 1513, he first saw the Pacific Ocean from a peak of Darien. Keats has celebrated the event in a famous sonnet, ending:

> "When with eagle eyes
> He stared at the Pacific, and all his men
> Look'd at each other with a wild surmise,
> Silent, upon a peak in Darien."

Through intrigues, Balboa lost his command in 1514 to Davilla, whose daughter he had married. After several successful expeditions while subordinate, Balboa was accused of treason by the envious Davilla, and beheaded in 1517.

See Pacific Ocean.

Baldur (*bôl'dẽr*) or **Balder,** the beautiful god of light in Norse mythology, and one of the heroes of the *Edda*. He was called "the Good" and "the Beautiful," and loved by gods, men and nature for his gentle wisdom, his eloquence and purity. "Wherever he went his coming was like the coming of sunshine, and all the beauty of summer was but the shining of his face." Only Loki the destroyer hated him. Baldur dreamed that his life was endangered, and his mother, Frigga, secured an oath from all things, animate and inanimate, not to injure him. The mistletoe was so weak she overlooked it. It became the delight of the gods to use him as a target, for nothing would hurt him. Loki, disguised as an old woman, learned the secret of the mistletoe, and shaped an arrow from it which he put in the hands of the blind god Höder during the usual game with Baldur. Höder shot the arrow, which pierced the heart of Baldur. The twilight of the gods began. Hela, goddess of death, told a messenger from Frigga that Baldur might return to the gods if all things on heaven and earth would weep for him. Loki, disguised as a giantess, would not weep, and Baldur stayed in the lower world. The story is a sun myth, signifying the change of seasons. Baldur's life is the beauty of spring and summer, his death the twilight of autumn and winter.

See Mythology.

Baldwin, Robert, Canadian statesman, was born in York, now called Toronto, the son of a lawyer. In 1825 he was called to the bar, and entered the Upper Canadian legislature as a Liberal, in 1829. He is responsible for the establishment of changes which made the legislative branch of the government a power to express the will of the people. Before this brilliant Canadian Parliamentarian came into power, the executive branch of the government rejected the desires of legislators year after year. He was Premier of Canada in 1842-43, and again in 1848-51. During his last ministry there was an unprecedented amount of reform, chief among which was the revision of the Upper Canadian judicial system, the foundation of the University of Toronto on a basis of non-sectarianism, and the establishment of municipal government in Toronto.

Baldwin, Stanley, a distinguished British statesman, was born on August 3, 1867, the son of Alfred Baldwin, a prominent British industrialist, and Louisa MacDonald Baldwin. He was educated at Harrow and at Trinity College, Cambridge. He began his career with his father, and proved to be such an excellent industrialist, that when his father died in 1908, Baldwin's Limited, of which he inherited the control, was one of the largest engineering firms in the United Kingdom. In 1906, as a Conservative in Kidderminster, he met defeat in parliamentary elections. In 1908 he entered the House of Commons as a member from Worchestershire. He became Financial Secretary of the Treasury in 1917-1921. In the latter year he became President of the Board of Trade (1921-22). He was Chancellor of the Exchequer in 1922-23, during which time he was also deputy leader in the House of Commons. In 1923, he succeeded Andrew Bonar Law who resigned as Prime Minister because of ill-health.

During the World War, he gave one-fourth of his entire fortune as a gift to the British Government. In 1923, he came to the United States with the British Financial Mission, to fund the British War Debt. He visited Canada in 1927, the first Prime Minister to visit an overseas dominion while holding office. He manifested throughout his ministry a belief in tariff protection and conciliation of the working classes, and strongly supported the Trade Union Bill of 1927, which made another general strike such as followed the coal strike of 1926 impossible. He resigned his office in June 1929 and was succeeded by J. Ramsay MacDonald. Stanley Baldwin became leader of the Opposition. He was appointed Lord President of the Council in 1931, taking office in October 1932. In September 1932 he became Lord Privy Seal, succeeding Viscount Snowden, a Laborite. In the summer of 1934, Stanley Baldwin again assumed the reins of government during the absence of J. Ramsay MacDonald, who was obliged to take a much needed rest for several months. The career of this statesman has been characterized by a high idealism, expressed in a sentence from an address he made to the House of Commons in 1923: "Words of one syllable contain salvation for this country and the world. They are: Faith, Hope, Love, Work."

His works include: *Peace and Goodwill in Industry* (1925); *The Classics and the Plain Man* (1926); *On England and other Addresses* (1926), and *Our Inheritance* (1928).

Balearic (*băl-ē-ăr'ĭk*) **Islands,** a group of islands lying off the Mediterranean coast of Spain, comprising Majorca, Minorca, Iviza, Formentera, Cabrera and several islets. The group is of limestone formation, and there are beautiful marbles, and veins of lead, iron, coal, cinnabar, and copper. The highest peak is situated on Minorca and is 5,250 feet above sea level. The islands extend over an area of 1,935 square miles. Vines, olives and fruit trees are abundant, and the islands are known for oil and pitch. Cattle, sheep and goats are raised, but the most famous animal life is the edible snail of Majorca, and the domestic fowl of Minorca (called *Minorcas*). Port Mahon, of Minorca, is one of the finest harbors of Europe.

The Phœnicians and Greeks visited the islands in early times. Carthage subjected them, but the Romans took possession in 123 B.C. The natives were famous slingers, their name of *Baleares* being derived from the Greek *ballein,* meaning "to throw." These slingers became a regular contingent of the Roman army. In 423 the Vandals overran the islands, and in 798 the Moors took possession, making the islands prosperous although piracy was prevalent. From 1232 to 1344 the group was known as the independent kingdom of Mallorca. In 1349 they were united with the kingdom of Aragon. The Peace of Utrecht accorded them to England in 1713; the Treaty of Amiens, however, re-ceded them to Spain, in 1803. At present they are a Spanish province. The population, according to the census of 1930, was 351,339. Palma, the capital, is situated on Majorca, and has a population, including the commune, of 77,000.

See MAJORCA ISLAND; MINORCA ISLAND.

Balfe (*bălf*) **Michael William,** an Irish musician and composer, was born in Dublin in 1808. He made his debut as a violinist at the age of nine. After studying under various masters, in London and Italy, he wrote his first work, *La Pérouse,* in 1826. This ballet was performed in Milan. He composed many works, chiefly operas and operettas, after 1830. In 1846, he was appointed conductor of the Italian Opera in London. His most successful operas are *The Bohemian Girl* (1843); *The Rose of Castile* (1857), and *The Talisman* (1874).

Balfour (*băl'fo͝or*), **Arthur James,** First Earl and Viscount Traprain of Whittingehame, a distinguished British statesman and man of letters, was born in Scotland, on July 25, 1848, of an aristocratic family. He was educated at Eton and at Trinity College, Cambridge. In 1874 he entered Parliament as Conservative member for Hartford. From 1878 to 1880 he served as private secretary to his uncle, Lord Salisbury, the Secretary of State for Foreign Affairs. From 1886 to 1905 he represented Manchester in Parliament. He served as President of the local government board in 1885, and Secretary of State for Scotland in 1886. In 1887 he became Chief Secretary for Ireland, and in 1891 he became First Lord of the Treasury and government leader of the Conservative Party in the House of Commons. From 1892 to 1895 he led the Opposition in the House as the Liberals gradually rose to power. In July, 1902, he succeeded Lord Salisbury who retired as Prime Minister. He held this portfolio until 1905 when he resigned and was succeeded by Sir Henry Campbell-Bannerman, a Liberal.

In the first Coalition Cabinet of Mr. Asquith in 1915, Arthur Balfour held the portfolio of First Lord of the Admiralty. In 1916, upon the accession of Lloyd George, he entered the Foreign Office as Foreign Secretary. He was head of the British War Mission to the United States in 1917, during which visit he conferred with President Wilson and addressed both houses of Congress. It was in this same year that he issued the Balfour Declaration, which pledged the British Government to the "establishment in Palestine of a National Home for the Jewish People." He also represented his country at the Peace Conference at Versailles. He resigned as Foreign Secretary in 1919 and became First President of the Council. He represented Great Britain at the first Assembly of the League of Nations in 1920, and at the Washington Disarmament Conference in 1921.

In 1922, at the request of King George, he entered the House of Lords and became its leader, after serving nearly fifty years in the House of Commons. In 1923 he served on the National Debt Commission, and in 1924 he became National Chairman of the Government Commission on Industry and Trade.

Lord Balfour received the Order of Merit in 1916, and the chancellorship of Cambridge in 1919. In 1922 he was created first Earl of Balfour and Viscount Traprain of Whittingehame. He was an excellent scholar and philosopher, and a brilliant debater. He ever was cool, clear-sighted, quick to think, speak, and act. The last years of his life were passed in almost complete retirement. He died in 1930. He was the author of *Essays and Addresses* (1893); *The Foundations of Belief* (1895); *The Fiscal Reform* (1906); *Arthur James Balfour as a Philosopher and Thinker* (1912); *Theism and Humanism* (1915); *Essays, Speculative and Political* (1920); *Theism and Thought* (1923), and *Opinions and Arguments* (1927).

Balfour, Francis Maitland, a Scottish embryologist, and brother of Arthur James Balfour, was born in Scotland in 1851. He was educated at Harrow and Trinity College, Cambridge. His investigations were of great importance. His *Comparative Embryology* (1879-1882) presented all that was known about the developmental stages of animals, and has proved to be a work of almost priceless value to students of embryology. This highly gifted naturalist took a leading part in founding the Cambridge School of Natural Science. He died on July 19, 1882, with his guide, while attempting to climb one of the spurs of Mont Blanc in the Alps.

Baliol (*băl'yŭl* or *băl'yŭl*), **John de**, king of Scotland, was born in 1249. He was called "Toom Tabard," or "empty-jacket," by the Scots. He was related to the royal family through his mother, and upon the death of Princess Margaret, the Maid of Norway, in 1290, who was heir to the throne, he became a competitor for the throne of Scotland, with Robert Bruce. Edward I, King of England, was asked to be arbiter of the question, and chose John de Baliol, who swore obedience to him as feudal lord. Edward I, however, took this opportunity to subject de Baliol and Scotland to England. Consequently, John de Baliol renounced his oath and in 1295 made a treaty with France, a country then at war with England. Edward immediately invaded Scotland, took de Baliol prisoner, and compelled him to give up his crown on July 10, 1296. He was allowed to settle on some of his own estates in Normandy, in 1302, and died there in 1315.

Balkan (*bôl'kăn* or *bȧl-kăn'*) **Mountains, a** mountain range separating the waters of the Lower Danube from those that flow into the Ægean Sea; also, the whole mountain system from the Adriatic to the Black Sea, a continuation of the Carpathian system. In ancient times, this range was known as the Hæmus. The Balkans begin at the western extremity of the Transylvanian Alps, at the Iron Gates, which is a gorge of the Danube at the boundaries of Hungary, Rumania, and Serbia. On the west, they are bounded by the Morava Vardar basins, and are chiefly hills and ridges which attain a maximum elevation of about 7,000 feet. The central Balkans are the main range, and divide the Danube and the Maritza watersheds. They have an average height of from 4,000 to 5,000 feet, and rise at times to a height of 7,000 feet. The eastern mountains, from Sliven to the Black Sea, are composed of many ridges, most of which are less than 3,000 feet high. The many passes in the Balkans are difficult to traverse. Chief among them are the Troyan, Rosalita, and Shipka, at elevations of from 4,000 to 5,000 feet. The highest peak is the Scardus, which rises 9,700 feet above sea level. The Balkans are composed chiefly of folded sedimentary strata, but in the western mountains are to be found many crystalline schists, in which are deposits of copper, lead and iron ore. These mountains throughout their length divide the drainage of the Balkan Peninsula, the rivers on the north flowing chiefly into the Black Sea, and those on the south into the Mediterranean through the Adriatic or the Ægean Seas. Various ranges extend southward from the Balkans in the direction of the Ægean Sea. Chief of these is the Rhodope, the southern prolongation of which forms the islands of the Ægean. The highest peak in this range is the Rilo Dagh, which is about 9,900 feet above sea level.

Balkan Peninsula, The, that part of southeastern Europe which lies between the Adriatic and the Black Sea. Prior to the World War the Balkans comprised Serbia, Montenegro, Rumania, Bulgaria, Greece and Turkey in Europe. To-day the Balkans include Czechoslovakia, Rumania, Yugoslavia, Albania, Greece and Turkey in Europe. The northern boundary of this peninsula is the Save and the Lower Danube. On the south lies the Ægean Sea. Nearly the whole of the peninsula is mountainous, the chief plains being those along the Danube River. There is a great variety of climate, both as to the range of temperature and the amount of rainfall. Much of the land in the east and south depends upon irrigation to make it productive. The rivers of the peninsula empty into either the Black or the Ægean Sea. The principal waters are the Danube and the tributary of the Lower Danube, the Kulpa, the Maritza, Kara Su, Vardan, and the Indje rivers and Lake Scutari and Lake Ochrida. The chief industries are cattle-raising, agriculture, fruit-growing and manufacturing. The country is rich in minerals, but it is only in recent years that their development has been undertaken.

For more than four centuries the Balkan problem, that phase of the Eastern question arising from the relations of Turkey, the Balkan states and Russia to each other and the rest of Europe, was most pressing. Repressive government long subjected the people of the Balkan Peninsula. It was only after the close of the World War that the dissension subsided somewhat. In 1934 the Balkan Peninsula entered upon a new era with the signing of a "pact of understanding" at Athens by the Foreign Ministers of Greece, Turkey, Rumania, and Yugoslavia.

Many months of negotiating preceded the actual acceptance of the agreement. The major difficulty throughout the negotiations had been Bulgaria. Yugoslavia was insistent that the terms of the agreement be so constructed as to enable Bulgaria and Albania to adhere to its principles. Both of these states strenuously objected to any bilateral pacts which might affect their territorial claims against their neighbors. Since 1928 the Little Entente has accepted in principle the Kellogg-Briand pact. It is in accord with the principle therein outlined that the Balkan Pact was consummated. The pact contains the following agreements:

"1. Greece, Rumania, Turkey and Yugoslavia guarantee mutually the security of all their Balkan frontiers.

"2. They undertake to consult with each other on the measures to be taken in the face of eventualities susceptible of affecting their interests as they are defined by the present agreement. They undertake not to embark on any political action directed against any other Balkan State non-signatory to the present agreement without previous mutual discussion, nor to assume any political obligation toward any other Balkan State without the consent of the other high contracting parties.

"3. The present agreement will come into force immediately upon its signature and will be ratified as soon as possible. It will be open to all the Balkan countries, whose adhesion will be the object of a favorable examination by the high contracting parties, and will take effect as soon as the other signatory countries have notified their agreement."

In the Bulgarian capital, Sofia, the consensus of opinion was that the pact had been directed primarily against Bulgarian interests and her "legitimate aspirations for the removal of injustices resulting from the peace treaties." Bulgarian officials regard the Balkan Pact as an "instrument specially designed to prevent friendship between the two branches of the Slav race in the Balkans."

The population, which totals approximately 17,000,000, is composed of Slavs, Rumanians, Greeks, Bulgars, Turks, and a scattering of Jews, Armenians, gypsies, and Circassians. The interests of these peoples and desires for independence on the part of each and every one, have been responsible in large part for the numerous struggles and Balkan Wars in which the peninsula has been involved.

See ALBANIA; BALKANS; BALKAN WARS; BULGARIA; CZECHOSLOVAKIA; GREECE; LITTLE ENTENTE; RUMANIA; TURKEY; WORLD WAR. (See LITTLE ENTENTE).

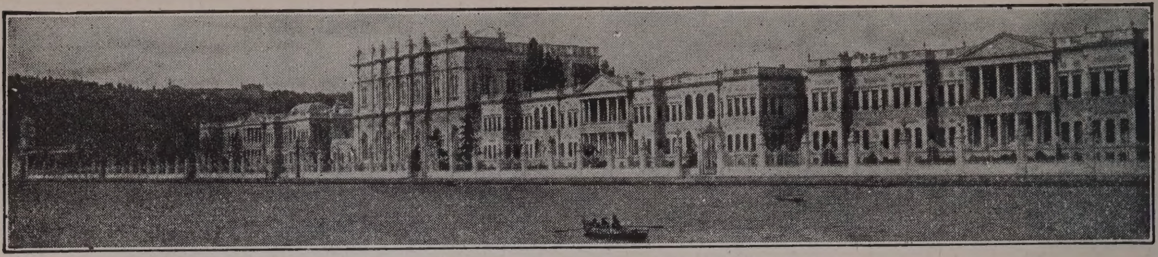
Balkan Wars, wars fought in the Balkan Peninsula in 1912 and 1913 in particular, and the continual uprisings from the time the Turkish Empire was established in Europe in the fourteenth and fifteenth centuries down to the World War. The prophecy of danger to the peace of Europe in Serbia's feeling of resentment toward Austria was fulfilled almost to the letter by the rapid chain of events following Sunday, June 28, 1914, when the Crown Prince of Austria and his wife were assassinated by Gabrilo Prinzip, a student, in Sarajevo, Bosnia. Austria charged that Serbian officials had plotted the assassination and demanded that Austrian officials be permitted to enter Serbia and participate in an investigation. This Serbia, disclaiming all responsibility for the assassination, refused to permit, as being a surrender of her independence, but proposed arbitration.

Austria thereupon declared war on Serbia, and the consequent military activity of Russia led Germany to declare war upon her under the Dreibund and also upon France as Russia's ally under the Dual Alliance.

Underneath the immediate causes of this most gigantic struggle in history lie national ambitions and racial sympathies and antipathies reaching back for centuries. To understand the Balkan war of 1912-13, which changed every boundary line in the peninsula, and the vital interest of six great European powers in the terms of peace, it is necessary to go back to a time before Columbus. When the Turks took Constantinople, in 1453, after having occupied Adrianople for a century, the old Roman Empire of the East was abandoned to Moslem hordes. The Christian peoples of the Balkans were left to defend themselves. Dividing along racial lines they fought under their native leaders. Even after they were conquered, they continued to resist Turkish misrule and religious persecution. For three hundred years Bulgaria, and Serbia which then included Montenegro and Northwestern Turkey, stood as a bulwark between the Turk and Western Europe. Montenegro separated from Serbia, and its 250,000 mountaineers maintained their independence. In 1830 England, France and Russia helped Greece in her struggle for freedom, chiefly because of the sympathy for the ancient glory of Athens. With Russia's assistance Rumania became an independent kingdom.

In 1876 the Turks entered upon a series of massacres of Christians in Bulgaria. Russia, coming to the defense of the Greek Catholics, made war on Turkey, and would have taken Constantinople (now Istanbul) had she not been stopped by the other powers. The position of this commanding site on the Bosporus has, in turn, made the Persians, Gauls, Greeks, Romans and Turks mistress of the Eastern Mediterranean. Its possession to-day by any strong government would disturb the balance

THE BALKANS AND THE PEACE OF EUROPE



PALACE OF THE SULTAN, CONSTANTINOPLE

Relation of the Balkan War of 1912-1913 to the World-Wide Conflict of 1914.

History Shows the Underlying Causes of Both Wars Were Many Centuries Old—How the Lesser War Brought on the Greater.

THE prophecy of danger to the peace of Europe in Servia's* feeling of resentment toward Austria, contained in the present article on the Balkan situation which originally appeared in the revision of *The Student's* a year previous to this terrible crisis, was fulfilled almost to the letter by the rapid chain of events following Sunday, June 28, 1914, when the Crown Prince of Austria and his wife were assassinated by Gabrilo Prinzip, a student, in Sarajevo, Bosnia. Austria charged that Servian officials had plotted the assassination and demanded that Austrian officials be permitted to enter Servia and participate in an investigation. This Servia, disclaiming all responsibility for the assassination, refused to permit, as being a surrender of her independence, but proposed arbitration.

Austria thereupon declared war on Servia, and the consequent military activity of Russia led Germany to declare war upon her under the Dreibund and also upon France as Russia's ally under the Dual Alliance.

Underneath the immediate causes of this most gigantic struggle in history lie national ambitions and racial sympathies and antipathies reaching back for centuries; and the student should read carefully our articles on each of the countries involved, as given in the History Outlines and also, among others, "Franco-German War" (707), "Great Powers of Europe"—(799).

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MONTENEGRIN ARTILLERY AND EARTHWORKS

MONTENEGRIN GENERAL WATCHING BATTLE

*Either Servia or Serbia is correct.

KING NICHOLAS OF MONTENEGRO

THE SULTAN, MEHMED V.

KING FERDINAND OF BULGARIA

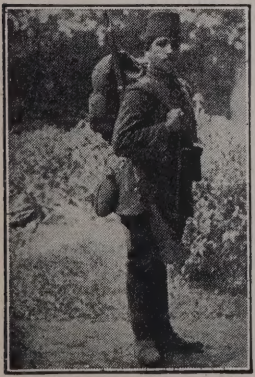
KING PETER OF SERVIA

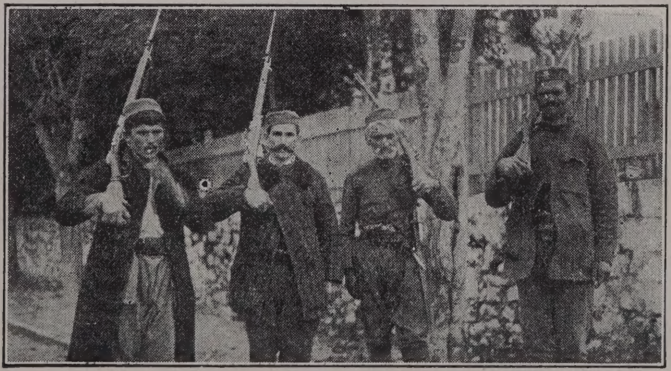
LATE KING GEORGE OF GREECE

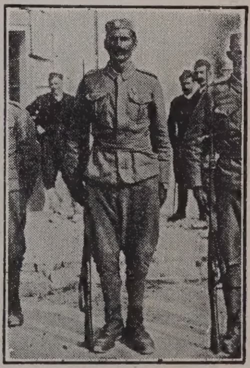
KING CONSTANTINE I. OF GREECE

position of this commanding site on the Bosphorus has, in turn, made the Persians, Gauls, Greeks, Romans and Turks mistress of the Eastern Mediterranean. Its possession today by any strong government would disturb the balance of power of all Europe. All questions could have been settled satisfactorily by the treaty of Berlin, in 1878, had Constantinople been given to Turkey and the rest of Moslem territory divided up among the Balkan States. But by the jealousies and mischievous interference of the powers, Bulgaria and Servia were allowed a smaller measure of liberty and territory than they had won, and Turkey was continued in misrule over many Christian peoples. Thus a situation was created that menaced the peace of Europe for thirty-five years. Then, instead of keeping order in Turkey as they had promised to do, it became the policy of the countries in the Triple Alliance to profit by the growing feebleness of the Turkish government. Austria annexed Bosnia and Herzegovina, old Servian provinces on the Adriatic. Germany got railroad concessions in Asia Minor, and Italy occupied Tripoli, a Turkish possession in Africa. When all the resources of Turkey were engaged in a war with Italy and a revolution at home, the Balkan States saw their opportunity to reassert their rights.

As early as February, 1912, Bulgaria, Servia, Montenegro and Greece entered into a secret alliance to drive Turkey out of Europe. Every detail of the plan was well


UNIFORM OF TURKISH SOLDIER


TYPES OF MONTENEGRIN RESERVISTS


UNIFORM OF THE ALLIES

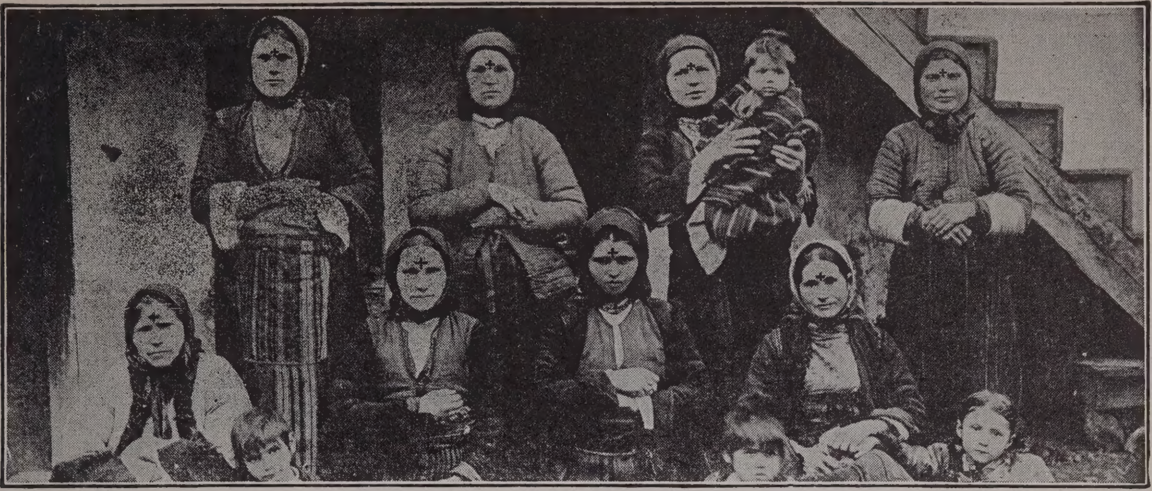
MONTENEGRIN MOUNTAIN CHIEFS IN PROCESSION, PRECEDED BY CRIER

TURKISH CAVALRY ON THE MARCH

thought out, and military genius shown in the thorough preparations for war. On the eighth of October Montenegro declared war on Turkey. By the seventeenth all four armies were in the field, each with an objective nearest its own boundary. The Greeks, with fleet and land forces moved on Saloniki and Janina. The Bulgarians marched toward Adrianople, "jewel of the Orient," and the old Moslem capital. The Servians attacked Novi Bazar and protected the rear of the 40,000 Montenegrins who besieged Scutari. This was the Turkish stronghold perched on the rocks above the old Servian port on the Adriatic.

The allies were warned by the powers that they would not be allowed to keep any conquered territory. But a series of swift victories paralyzed Turkish resistance and obliged the powers to change their tone. France proposed to let the Balkan States divide Turkish territory in Europe, leaving to Turkey only Constantinople and a strip of seacoast. These terms were accepted at the peace conference in London, late in January, but were repudiated by an overthrow of the Turkish government. War was renewed in February. Adrianople and Janina fell in March. Scutari was captured in April. Montenegro and Servia, however, were robbed of the fruits of this victory. Austria had demanded that this seaport should become a part of the newly created State of Albania. Some color of justice was given to this demand by the fact that the Albanians too had struggled for freedom for centuries. The other powers agreed, in the interests of European peace. By the terms as finally concluded, Turkey lost 60,000 square miles and had only about 5,000 square miles left in Europe. Montenegro and Servia submitted to overwhelming force again, as in 1878. But here was a seed of discontent that finally germi-

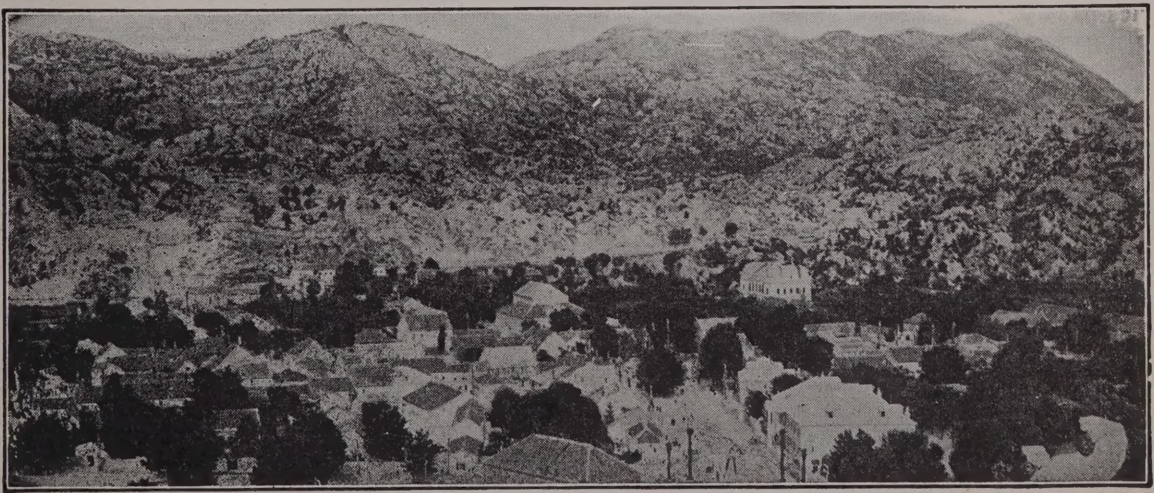
MONTENEGRINS IN CAMP



THE CROSSES ON THE FOREHEADS OF THESE BULGARIAN PEASANTS ARE SUPPOSED TO PROTECT THEM FROM THE TURKS

nated the Great War. The assassin of Archduke Ferdinand, so Austria asserted, was a member of a Serbian secret society which aimed to detach Bosnia and Herzegovina from Austria-Hungary and make them a part of the Kingdom of Serbia. Austria asserted that the Serbian Government planned the assassination and made this the pretext for an investigation under circumstances that would virtually have placed Serbia under her permanent control. On Serbia's refusal to submit, Austria declared war.

BULGARIAN PEASANTS LAYING FOOD, AS A SACRIFICE, ON GRAVES



VIEW OF CETINJE, CAPITAL OF MONTENEGRO, SHOWING HOW THE BALKAN PEOPLE ARE DEFENDED BY THEIR MOUNTAINS of power of all Europe. All questions could have been settled satisfactorily by the treaty of Berlin, in 1878, had Constantinople been given to Turkey and the rest of Moslem territory divided up among the Balkan States. But by the jealousies and mischievous interference of the powers, Bulgaria and Serbia were allowed a smaller measure of liberty and territory than they had won, and Turkey was continued in misrule over many Christian peoples. Thus a situation was created that menaced the peace of Europe for thirty-five years. Then, instead of keeping order in Turkey as they had promised to do, it became the policy of the countries in the Triple Alliance to profit by the growing feebleness of the Turkish government. Austria annexed Bosnia and Herzegovina, old Serbian provinces on the Adriatic. Germany won railroad concessions in Asia Minor, and Italy occupied Tripoli, a Turkish possession in Africa. When all the resources of Turkey were engaged in a war with Italy and a revolution at home, the Balkan States saw their opportunity to reassert their rights.

As early as February, 1912, Bulgaria, Serbia, Montenegro and Greece entered into a secret alliance to drive Turkey out of Europe. Every detail of the plan was well thought out, and military genius shown in the thorough preparations for war. On the eighth of October Montenegro declared war on Turkey. By the seventeenth all four armies were in the field, each with an objective nearest its own boundary. The Greeks, with fleet and land forces moved on Saloniki and Janina. The Bulgarians marched toward Adrianople, "jewel of the Orient," and the old Moslem capital. The Serbians attacked Novi Bazar and protected the rear of the 40,000 Montenegrins who besieged Scutari. This was the Turkish stronghold perched on the rocks above the old Serbian port on the Adriatic.

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See ALBANIA; AUSTRIA; BALKAN PENINSULA; BULGARIA; CZECHOSLOVAKIA; GREECE; RUMANIA; SERBIA; TURKEY; WORLD WAR.

Ball, Sir Robert Stawell, a famous British astronomer and popular scientific lecturer of his time, was born at Dublin, Ireland, on July 1, 1840. He was educated at Trinity College, Cambridge. He was the Lowndean professor of astronomy and geometry at Cambridge. In 1865, he became Lord Rosse's astronomer at Parsontown. In 1873 he received the appointment of professor of applied sciences and mathematics in the Royal Irish College of Science, and in 1874 became astronomer royal for Ireland and professor of astronomy at Dublin. It was said that he was one of the few scholars who could invest abstruse subjects with fascinating interest. He died in 1913. His works include: *Atlas of Astronomy; Story of the Heavens; Time and Tide; The Story of the Sun; Natural Sources of Power,* and *A Primer of Astronomy.*

Ballad, a simple narrative poem intended to be sung. The ancient ballad was the first poetical form, generated from the folk life, and originating in the primitive gathering to celebrate some stirring event. The story in verse was chanted spontaneously to the accompaniment of gesture and dance, while the crude music of the particular tribe or racial group marked out the rhythm. The word itself is a derivation of the late Latin *ballare,* a word meaning "to dance," indicating its early association. Gradually, as civilization advanced, minstrels and bards took over the ballad making, but the people were quick to learn and alter these ballads, so that for centuries there was no known author for any, as the ballad passed through so many hands in its formative years. To-day we have as many as ten or twenty versions of some of the more modern ballads, indicating the process of change.

Just as in earliest times the ballad had arisen from the need for expression in times of emotion, so the minstrel used it, composing and singing the old hero stories, or more often tales of events as they happened, brave or cruel deeds, battles, deaths. The early minstrel carried his own music as he wandered about, unless attached to some court or the castle of a great lord. At the fireplace in the huge castle hall, or on the village green, he improvised as his fingers touched harpstrings or lutestrings in familiar rhythmic patterns. The ballad maker was the newspaper, the radio of early days, as well as the historian and the poet, and he sang into his verses the reports of daily happenings, probably colored by his imagination and his emotional response to his audience, as a reporter of to-day colors his accounts in keeping with the times.

Of these ancient ballads, we have only traces, modified as they have come down through the centuries. They existed for every people, part of the folk lore, the myth and legend. Of what is available to-day, the traditional English and Scotch ballads are the most illustrative group, although they are comparatively modern.

Ballads, in the early days of anonymity, had certain marked characteristics: a refrain or a repetition which had the effect of a refrain; rhythm; and often a touch of the supernatural. Certain colors (blue, red, white, green, gold, silver) were employed, and a sword, ring, fan, magic belt or talisman of some sort figured in many ballads. Thus, in *The Cruel Brother,* the refrain is illustrated:

"What will you leave to your mother dear?
With a hey ho and a lillie gay
My velvet pall and my silken gear
As the primrose spreads so sweetly.
What will you leave to your sister dear?
With a hey ho and a lillie gay
My silken scarf and my gowden fan
As the primrose spreads so sweetly."

Colors are prominent in *Thomas Rhymer:*

"She turned about her milk-white steed

……

For forty days and forty nights
He wade thro red blude to the knee."

The ballads were of two kinds: court ballads for royalty or nobility, and street ballads for the common people. A comparison of *Sir Patrick Spens* and *Kemp Owyne* of the early English ballads will show this contrast markedly, the former being a perfect example of the restraint, dignity and noble language of the court ballad, the latter having more coarseness and carelessness, and the superstition that characterized street ballads. The beginning stanza of *Sir Patrick Spens* strikes the keynote:

"The king sits in Dumferling towne
Drinking the bluid-red wine:
O, whar will I get guid sailor
To sail this schip of mine?"

The following stanza taken at random from *Kemp Owyne* shows its style as well as its typical ballad characteristics:

"Here is a royal belt," she cried,
"That I have found in the green sea:
And while your body it is on,
Drawn shall your blood never be!
But if you touch me, tail or fin,
I vow my belt your death shall be."

Among other famous early ballads are the *Robin Hood* groups, *Chevy Chase; The Wife of Usher's Well,* and *Edward.* Famous collections of old English and Scottish ballads are Percy's *Reliques of Ancient English Poetry,* and Scott's *Minstrelsy of the Scottish Border.*

After the invention of printing, ballads were no longer handed down by word of mouth or in manuscript. The minstrel disappeared and the poet came into being, using the ballad as a deliberate form of artistic poetry. The ballad, through this transition, gained in artistic qualities, becoming more smooth and touched with more delicate nuances of feeling, but it lost much of the sincerity and folk atmosphere of the early days. Among the more famous ballads written by individual poets were: *Lochinvar,* Sir Walter Scott; *Lord Ullen's Daughter,* Sir Thomas Campbell; *Rime of the Ancient Mariner,* S. T. Coleridge; *La Belle Dame Sans Merci,* Keats; and *Ballad of East and West,* Kipling. Alfred Noyes, contemporary poet, has given us two ballads which are outstanding: *The Highwayman,* a splendid example of modern verse corresponding to the old court ballad, and *Forty Singing Seamen,* which is of street ballad type. This form of poetry has been a favorite, attempted by the majority of poets from the seventeenth century on to the present, and popular in the present day.

Balliol College. See OXFORD, UNIVERSITY OF.

Balloon. See ÆRONAUTICS.

Balloon Ascension. See STRATOSPHERE FLIGHTS.

Ball's Bluff, a bluff on the Virginia side of the Potomac, is situated thirty-three miles northwest of Washington, D. C. It was the scene of a minor battle of the Civil War, on October 21, 1861. A force of 1,900 Federal soldiers under Colonel E. D. Baker was surrounded and defeated by about 3,000 Confederate soldiers under General Evans. Colonel Baker was killed and nearly a thousand of the Federals killed, wounded, or taken prisoner. The Confederates lost only about 150 men.

See BAKER, EDWARD DICKINSON.

Balm of Gilead (*bäm of gĭl'ē-ăd*), a balsam obtained from a small African or Asiatic evergreen tree. This balsam is a liquid resinous substance, yellowish green, with a warm, bitter taste and a fragrant odor. It is valued highly in the east for its fragrance and its medicinal qualities. The finest balm of Gilead is known also as the balm (or balsam) of Mecca. It is gold in color and thick like honey. Although it is irritating to the skin, the Turks value it as an unguent and a cosmetic. It was precious in Bible times, from which came the application of the phrase to mean the healing or mitigation of pain, even in a spiritual sense. Mixed with oil, it is used by the Roman Catholic Church to consecrate bishops, baptize children, confirm, and ordain; to crown kings, and to consecrate churches, altars, and fonts. An American balm of Gilead is obtained from the tree *Iciea Carava,* a species of *Amyridaceae.*

Balmoral, (*băl-mŏr'ăl*), a royal castle in Aberdeenshire, Scotland. It is situated forty-five miles west of Aberdeen, and is 926 feet above the sea, on a plain that slopes from a height of 1,437 feet to the River Dee. It was bought by Prince Albert of England in 1848, and became the favorite residence of Queen Victoria. As the old castle was not large enough for the royal family, Prince Albert, Consort of Queen Victoria, constructed a new one in 1853-5, at a cost of about £100,000 ($500,000). It is a granite structure, in Scottish Baronial architecture. The estate of 40,000 acres is about three-fourths deer forest, and also contains fine trout lakes. For years, the royal family went to Balmoral every autumn. The English fashions were set there, and the name of the castle was given to many styles, in particular a wool petticoat dyed red with blue and black stripes around the bottom, and a pair of stout walking shoes laced in front.

See VICTORIA, QUEEN.

Balsam (*bôl'săm*), an aromatic substance which flows spontaneously or by incision from certain trees or plants; or any of several balsam-yielding trees, or any plant of the genus *Impatiens,* especially the common garden balsam. Trees of such genuses as *Myroxylan* and *Abies* yield an oily, medicinal substance famous for its aroma and healing qualities. Both tree and substance are called balsam, and from the medicinal qualities of the substance, the word balsam has come to be applied to anything that heals, soothes, or restores. The word, when used alone, usually means balsam either of Peru or of Tolu, which is very famous. This balsam is used to give the flavor of vanilla in confectionery, and the aroma to perfume; or as a gentle stimulant or tonic. In the United States, a fragrant fir of the northern woods and swamps, and a resinous poplar of the midwest, are both called balsam. There are at least a hundred species of garden balsam, chiefly natives of the East Indies, many of which are annuals and have beautiful white or red flowers. The common East Indian plant is also to be found in Japan, and is called Touch-me-not and Lady's Slipper. The common garden balsam of the United States is called jewel-weed or snap-weed, and grows in damp places from Nova Scotia to Oregon, and south to Florida and Missouri. The word, balsam, is thus used to designate any of several oleoresins that contain resin, essential oil, and also benzoic or cinnamic acid. These latter are often called "true" balsams, among which the balsam of Peru is the most important.

Baltic (*bôl'tĭk*), **Battle of the,** a naval battle between the English and Danish fleets in the harbor of Copenhagen, April 2, 1801. The English fleet, under Sir Hyde Parker, with Lord Nelson second in command, was ordered to the Baltic to break up the alliance just formed between Russia, Prussia, Denmark and Sweden. Nelson led the attack, and when Parker gave the signal to stop the fight, Nelson put the glass to his blind eye, and said he could not see the signal. He continued the attack and captured or destroyed nearly the whole Danish fleet. His victory helped greatly to break up the alliance.

See COPENHAGEN.

Baltic Sea, a shallow, irregularly-shaped, inland sea, extending northeasterly from the North Sea. It is bounded by Denmark, Germany, Sweden, Poland, Lithuania, Latvia and Estonia. Its length extends for about 930 miles, and its width varies from fifty to 425 miles. Its depth also varies, from forty to 140 fathoms. The area of the Baltic Sea is 160,000 square miles. The principal gulfs are those of Finland and Riga, which indent Russia, and Bothnia, which lies between Russia and Sweden. Smaller gulfs and bays are along the coast of Germany. The principal islands are Rügen, Bornholm, Olard, Gottland, Osel, Dago and the Åland and Danish groups. The most important harbors on the Baltic are Copenhagen, Kiel, Lübeck, Danzig, Stetten, Tallinn, Leningrad, Malmö, Königsberg, Riga, Kronstadt, Helsingfors (Helsinki), Åbö, Stockholm and Karlskrona. The Baltic drains one-fifth of all Europe, including western Russia, northeastern Germany and nearly all of Sweden. There are about 250 rivers flowing into it, chief of which are the Oder, Vistula, and the Düna. This makes the water only about one-third as salty as that of the Atlantic, and much clearer. It freezes easily, hindering navigation especially in the north, for three to five months annually. Navigation is dangerous at any time, due to the many islands, the sudden changes of wind, the violent storms, and the great tidal waves raised by the easterly winds. There is regular tidal action only on the southern coasts. The fauna are those of fresh water, and amber has long been cast up on the shores.

The Baltic Sea is of great commercial importance to northern Europe. It is connected with the North Sea by a series of winding channels, and chiefly by the Eider and Gotha Canals, and the Kiel Canal for ships, completed in 1895. The latter is cut through the Jutland Peninsula in Schleswig-Holstein, has a length of 61.3 miles, and makes it possible to avoid a dangerous 600 mile voyage. More than 40,000 vessels annually carry a tonnage of 7,000,000 through this canal. The principal exports of the countries around the Baltic are timber, hides, tallow and grain. The shipping trade is large. During the World War, its trade was disrupted and the Baltic was the scene of many naval engagements.

Baltic States, a term loosely applied to Estonia, Latvia and Lithuania, republics which were created after the close of the World War out of the former Russian provinces of Courland, Estonia and Livonia. They are bounded on the northwest by the Baltic Sea and on the east by Soviet Russia (U. S. S. R.). Some authorities include Finland among the Baltic

States, while others refer to it as a Scandinavian country. These governments originally belonged to Sweden, with the exception of Courland, which was a dependency of Poland. In the early eighteenth century they came under the domination of Russia through the conquests of Peter the Great. These states were granted their own administrative governments and the right of individual freedom of conscience. In 1856 these rights were confirmed. After 1880, however, Russia ignored these rights and made several attempts to assimilate the Baltic States. The Greek Orthodox Church began to proselyte in these regions. Russian language was substituted for German in the schools, and the courts and press were subjected to a severe censorship. In 1905 a formidable revolt occurred between the Lettish and Estonian peasantry and the Russian Government and German landowners. The Baltic provinces were under the domination of Germany for a short time during the World War, but were relinquished in 1919. The overthrow of the Russian czardom on March 12, 1917, gave the Baltic States an opportunity to establish themselves as separate republics.

The population is composed chiefly of Esths (Finnish) and Letts (a group closely akin to the Lithuanian). About seven and one-half per cent of the total population are German. The population of the Baltic States, excluding Finland, is estimated at 5,029,736.

See ESTONIA; FINLAND; LATVIA; LITHUANIA; RIGA.

Baltimore, the chief city of the state of Maryland, is the largest city on the Atlantic seacoast south of Philadelphia, and one of the principal ports of the United States. It is situated on the Patapsco River, fourteen miles from Chesapeake Bay. The river at Baltimore expands to a small inner bay, and an outer bay which accommodates the largest ocean steamships, affording a safe, extensive harbor.

Description. The city is directly connected by water with foreign ports, with the larger American Atlantic seaports, and with nearly all of the bay and river towns of Maryland and Virginia. It is served by fifty-one steamship lines, including the North German Lloyd, Hamburg-American, and the Red Star. Among smaller lines, the Baltimore Insular has recently inaugurated regular passenger service to Puerto Rico, and in 1932 the Clyde-Mallory Lines began weekly passenger service to Bermuda. Baltimore is also served by the Baltimore and Ohio; Pennsylvania; Northern Central; Wabash; Maryland and Pennsylvania, and the Baltimore and Annapolis railroads. Within the city limits there are extensive thoroughfares of which Fallsway is the most important. This great commercial highway is created by Jones' Falls, which divides the city into two parts.

Baltimore is popularly called the "Monumental City," a name which the city won shortly after the War of 1812 when the residents of Baltimore erected two monuments—one to Washington and the other to the defenders of North Point. To-day Baltimore is noted for its many fine specimens of architecture and sculpture. Washington Monument, of Doric style, is situated in Mount Vernon Place. The monument is 180 feet in height. From the top of this memorial, which is reached by a winding stairway of 220 steps within the shaft to the top, one may obtain a magnificent view of Baltimore, a city of great prestige and distinction. This celebrated monument was the first memorial to George Washington, erected by any city or state in the Union. Other imposing memorials have been erected to George Peabody, well-known philanthropist; Chief Justice Taney; and Francis Scott Key. Battle Monument was erected in memory of those heroes who fell in Baltimore in 1814.

Baltimore is famous as the first American city to be lighted by gas. It had the first electric street railway and the first electric elevated railway in the world. The first steam passenger train in America ran from Baltimore to Ellicott City; the first steamship to cross the Atlantic sailed from Baltimore. The first electric telegraph line was strung from Baltimore to Washington, and the first iron building was the former home of the *Baltimore Sun*. Baltimore was the first American city to have a paid fire department. The first school of dentistry in the world was established in the "Monumental City," and the first American Methodist Episcopal Church was organized there.

Buildings and Churches. Baltimore is famous for the splendid architecture of many of its public buildings. The Court House and City Hall are of white marble in Renaissance style. The Custom House is built of Maryland granite in Classic style. The Peabody Institute for the Education of Music, constructed of white marble, contains a world-famed historical library and a conservatory of music. The Walter's Art Gallery contains one of the finest private collections of paintings in the United States, in addition to special collections of ancient arms and armor, Japanese lacquer, and United States ceramics. Johns Hopkins University overlooks the city and harbor from an elevation, on which the buildings are constructed around a magnificent central group. Goucher College buildings are Romanesque in style of the Lombard type with Tuscan adaptations, constructed of dark undressed granite, with roofs of Roman-red tile. The church has a massive tower, reminiscent of a famous campanile just outside of Ravenna.

Baltimore is famed as the seat of a Roman Catholic archbishopric, the oldest see in the United States. The Cathedral is of Ionic architecture, with a great dome, and side aisles which terminate in the famous pictures *Descent from the Cross* by Guerin, a gift of Louis XVI; and *St. Louis Burying his Officers and Soldiers before Acre* by Steuben, the gift of Charles X. Among the other six hundred churches in the city, the First Presbyterian Church is noted for its Gothic spire which is three hundred feet high. The beautiful Oheb Sholom Synagogue is of the white marble which characterizes so many of Baltimore's famous buildings.

Parks. The city of Baltimore has seventy-nine public squares and parks which extend over a total area of 2,981,125 acres. The most famous and the loveliest is Druid Hill Park, one of the finest natural pleasure grounds of the world, which was originally 1,083 acres in area, but has since been enlarged. It contains famous springs, some of which are medicinal. A large zoo is located in this park. Among the remaining parks, the larger ones are Clifton, which covers an area of 866 acres; Carroll, which covers an area of 664 acres; Riverside, and Patterson. There is a large stadium and many city playgrounds are scattered throughout the city.

Commerce and Industry. Baltimore is a thriving commercial center. Its connections by water and rail with foreign and native centers of production and distribution afford excellent transportation facilities. Much of the produce of the South goes through the city, as well as a large share from the North and the West, making heavy traffic to the coast. Baltimore is the largest corn-exporting city in the United States, and a great export center for both coal and grain. In 1932, Baltimore's exports totalled $24,489,000; imports, $46,141,000.

The city has varied and numerous manufacturing enterprises. There are more than six thousand industrial plants located in the city. The largest copper-refining plant in America is situated here. It is the largest center in the United States for the manufacture of fertilizers, cotton duck, fruit canning, oyster canning, and straw goods. Other important manufactures include clothing, tobacco products, furniture, sheet iron and tin ware. Shipbuilding was a thriving industry during the World War. There are immense steel works located at Sparrow's Point, nine miles out of the city.

Education. Baltimore is one of the foremost educational centers in the United States. Its systems of graded and parochial schools maintain a high academic standard. In 1930 schools for handicapped children were established. The most important institution of higher learning is Johns Hopkins University, a nonsectarian institution, which was founded in 1876 by a Quaker philanthropist of that name, at a cost of $3,500,000. It was primarily an institution for graduate and research work, and possesses one of the finest postgraduate and medical departments in the world. Its hospitals are famed throughout the world. In 1933 there were 6,214 students and 618 faculty members at this institution. Goucher College for women was founded in 1888. Other institutions for higher education are Baltimore City College, Loyola University, St. Mary's University, Baltimore College of Dental Surgery, and a State Normal University. The Law and Medical departments of the University of Maryland are located in Baltimore.

Government. In 1796, Baltimore received a municipal city charter which underwent various modifications until 1898. In that year, the bicameral form of council government was adopted, which provided for a mayor and various necessary boards, commissions and departments. In 1923 the unicameral council government was adopted. The council consists of one branch of nineteen members, which includes a president elected by popular vote, and eighteen members elected from the six councilmanic districts. Under this plan the mayor, with the consent of the council, appoints most of the officials. The municipal finances are controlled chiefly by a Board of Estimates which consist of the mayor, president of the Council, city engineer, comptroller, and city solicitor. On May 2, 1932, the blue laws which were enacted two hundred years ago against Sunday amusements and trading, were repealed.

History. Baltimore is the youngest of the great American cities of the Atlantic seaboard. The city was first laid out in 1730, then but sixty acres, and was created upon the petition made a year earlier by certain residents upon the Patapsco to the Maryland legislature. In 1732 another town was started on the banks of Jones' Falls, a small stream, directly across from Baltimore-Town. The two settlements were consolidated in 1745. The city was named in honor of Cecelius Calvert, Lord Baltimore, founder and one of the proprietors of the province of Maryland. In 1767 the city became the seat of Baltimore County. Subsequently, however, the city and county were divorced and Baltimore to-day has a government independent from the county by which it is surrounded.

During the Revolutionary War, Baltimore became an important center and for a while housed the Continental Congress, after that body was forced to retire from Philadelphia. In 1780 Baltimore became a port of entry and in 1796 was incorporated into a city. Its local merchants became active in trade and shipping, and the "Baltimore Clippers," fast-sailing ships manufactured in Baltimore became world-famous.

During the second war with England, the War of 1812, the city was subjected to two attacks by the British—one by land and the other by sea. Both attacks, however, were unsuccessful. On September 12, 1814, Baltimore was attacked by land and in the struggle which ensued, the Battle of North Point, the British Commander, General Ross lost his life and his men retired without accomplishing their purpose. On the morning of the following day, September 13, the fleet opened fire upon Fort McHenry, the city's chief defense. Throughout the whole day and all of the night the bombardment continued and had the fort been taken Baltimore would have fallen prey to the enemy. When morning dawned, however, on September 14, the American flag was seen still flying over the ramparts of the unconquered stronghold and the enemy abandoned all hope of taking Baltimore. It was the sight of this American flag waving over Fort McHenry in that early dawn that inspired Francis Scott Key, who was a prisoner on a British man-of-war during the siege, to write America's national anthem, *The Star Spangled Banner.*

The first blood of the Civil War was shed in Baltimore on April 19, 1861, when a mob sought to prevent the passage through the city of the Sixth Massachusetts and the Seventh Pennsylvania regiments, then on their way to Washington in response to President Lincoln's call.

On February 7, 1904, the entire business section of the city was wiped out by fire which destroyed property valued at $125,000,000. Disastrous and devastating though it was, the conflagration proved the beginning of a new era in the life of the city. Not only were the destroyed buildings replaced, in most instances by better structures, but the municipality seized upon the opportunity for making extensive improvements. Many important business streets, which had been too narrow to accommodate the heavy traffic imposed upon them, were widened. The two thoroughfares skirting upon the wharf property of the basin—Light and Pratt Streets—were changed from narrow and unattractive streets to avenues of great width and beauty. New concrete piers were erected, and a complete new sewerage system installed. In the succeeding years there has been a steady development of civic consciousness which has utilized the natural geographic situation, the excellent harbor facilities, the diversified manufacturing possibilities and the growing demand for increased commerce and trade, until to-day Baltimore is acclaimed a famous metropolis.

In 1790 Baltimore had a population of 13,500. By 1900 this number had increased to 508,971, and by 1920 to 733,826. According to the census report of 1930 Baltimore has a population of 804,874.

See Key, Francis Scott; Maryland.

Baltimore, Lord or **Baron of,** the title of the Calvert family. George Calvert was born at Kipling, Yorkshire, about 1580. He was graduated at Oxford in 1597. He became secretary to Sir Robert Cecil and won favor with James I, who knighted him in 1617. In 1619 he became Secretary of State, and in 1621 and 1624 he was a member of the House of Commons. A short time later, he became a Roman Catholic, and resigned his seat in the house. He retained the king's favor, however, and was raised by him to the Irish peerage with the hereditary title of Lord or Baron of Baltimore.

Lord Baltimore was intensely interested in the colonization of America, and in 1621 sent a ship to Newfoundland to establish a settlement. In 1623 he was given a charter as Lord of Avalon to found a colony there. He visited America in 1627 and in 1629 brought his family to this country. The severe climate, however, and the hostile French caused him to petition Charles I for a charter to found a new colony in a more favorable location. He died in 1632 before the charter was issued. His son Cecil received in June, 1632, a grant of the territory called "Maryland" in honor of the queen. Cecil Calvert, who became Lord Baltimore on his father's death, founded the colony of Maryland although he never visited it. He sent out settlers with his brother Leonard, who was the first governor of Maryland and held that office from 1634 until 1647. The colony was wisely controlled by the Calverts. The city of Baltimore was named for Cecil, Lord Baltimore, the real founder of the colony. One of America's brightest birds, the Baltimore oriole, received his name as it wore the colors of his livery.

The title became extinct with Frederick, the sixth Lord Baltimore, who died without leaving an heir. All who bore the title were prominently associated with the history of Maryland.

Baltimore Oriole, or **Baltimore Bird,** a beautiful song-bird common in the United States from Mexico to Canada. The male is about seven inches long, with a sharp bill, pointed wings and a rounded tail. It has brilliant plumage, a glossy black on the head and upper part of the body with white-tipped wings, and the under parts bright yellow and orange. A glimpse of this bird caused the poet Lowell to write "Hush! 'tis he! My oriole, my glance of summer fire." The colors are those of Lord Baltimore's livery, which gave the bird its name. The female is smaller and wears more sober plumage. The bird winters in the south, and breeds in the north, building a pendulous nest about six inches long, of fibrous materials such as moss, threads, strings, horsehairs. It is situated preferably in an elm or willow, although almost any tree or vine near a house will do. Four to six eggs are laid, dull white in color dashed with brown. The song of the bird is a ringing whistle easily imitated, clear and pleasant. The Baltimore oriole is said to be one of the best architects in the world, and is valuable for the destruction of insect larvæ, such as the tent-caterpillar, and the canker-worm.

Baluchistan (*bá-lōō-chĭ-stän'*), a British dependency in northwestern India, is bounded on the north by Afghanistan, on the south by the Arabian Sea, on the west by Persia and on the east by Sind (British India). The country extends over 134,638 square miles of rugged and mountainous territory, expanses of sandy deserts and broad and high tablelands. Baluchistan includes British Baluchistan, an area consisting of districts, administered territories and tribal areas of 54,228 square miles; and the native states of Khelat and Las Bela, extending over an area of 80,410 square miles.

Surface. Baluchistan is mountainous, but has also broad and high tablelands and some extensive sandy deserts. One of its mountain systems extends north and the other east and west. Many of the mountains have great height and are snow covered, while the tablelands are very hot in summer and extremely cold in winter. Its most important rivers are the Bolan and Mula, which are located in the northeast.

Natural Resources. It is believed that the mineral wealth is quite important, and includes, gold, silver, lead, copper, iron, mineral salts and saltpetre. Throughout the country there is a great scarcity of water, and the soil generally speaking is not fertile. The following articles, however, are produced to some extent: wheat, barley, millet, cotton, rice, indigo and tobacco. Orchard and garden fruits are grown near the towns and vegetables are very plentiful. Attention is given to the breeding of fine camels.

Manufactures. The manufacturing interests are unimportant, and consist mainly of coarse fabrics, matchlocks and other weapons.

Government. The khan or tribal ruler receives an annual grant from India, and resides at Kelat, while his rule is almost confined to the surrounding country. Quetta is the largest town and has railway connection with India. It is strongly fortified, and is occupied by a British garrison. The country is a British protectorate, and while not wholly under their rule, is completely under British influence. Population over 915,000.

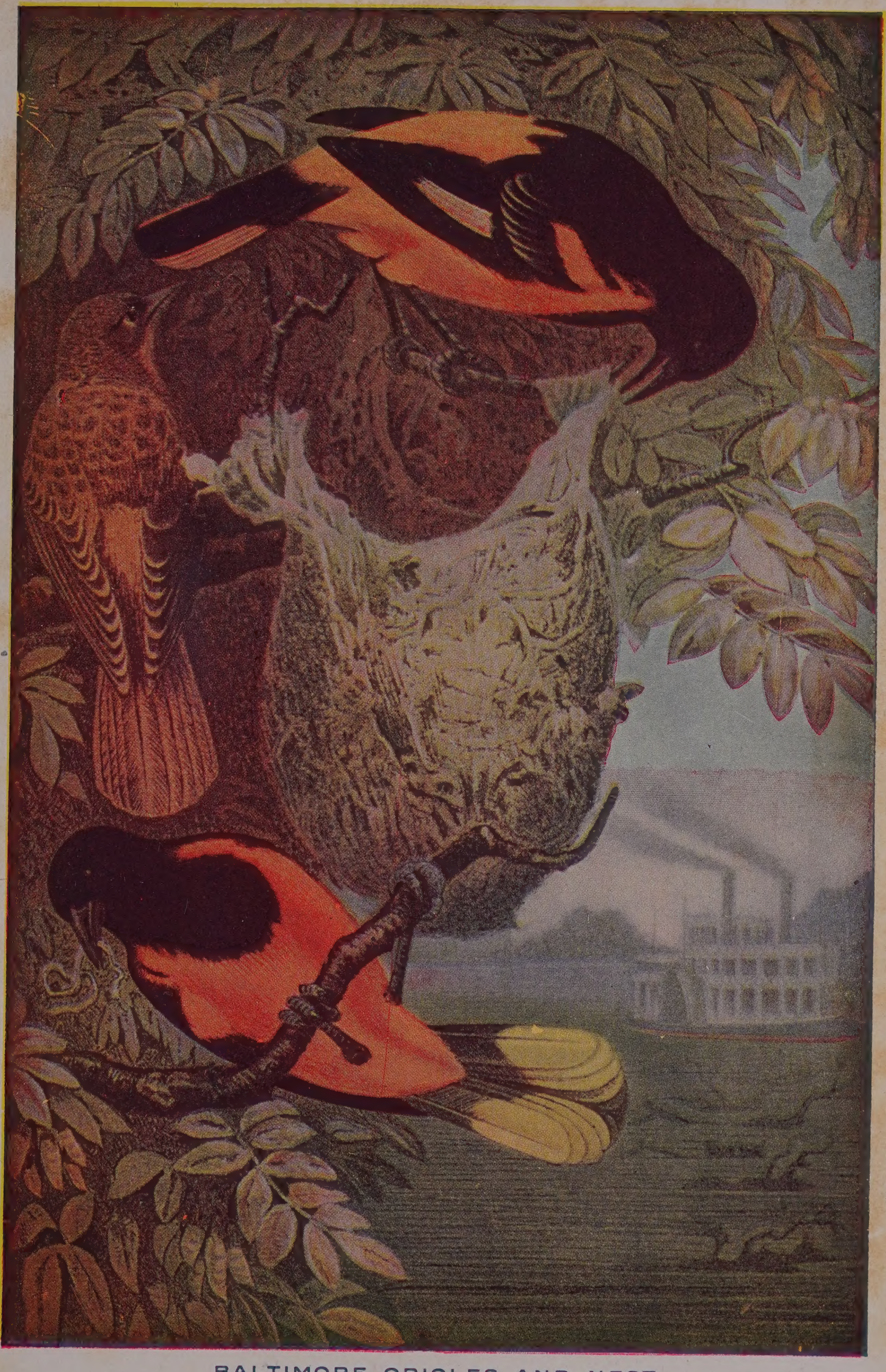
Balzac (*băl'zăk'*), **Honore de,** a great French novelist, was born at Tours in 1799. He studied law, but gave it up and went to Paris to try his fortune as an author. For ten years he lived in wretched circumstances, writing stories which were of little value. In his thirtieth year he wrote his first great novel, *The Last Chouan*, which brought him into notice. Soon after he began his great work, called *The Human Comedy*, which was intended to be a complete picture of modern life. He was a very hard worker, and wrote eighty-five novels in twenty years. Few writers have shown such power in describing character and in giving reality and life to their characters. Some of his best works are *Scenes of Provincial Life*, *Scenes of Parisian Life*, *La Peau de Chagrin* (The Magic Skin), *Le Cousin Pons*, *Séraphita*, *Contes Drôlatiques*, *Eugénie Grandet* and *Father Goriot.* He died at Paris, Aug. 18, 1850.

Bamboo', a kind of tree-like grass, which grows to a large size in the warmer parts of Asia and America. Some kinds are at least eighty feet high. It is used for a great variety of purposes, such as housebuilding, shipmasts, furniture, spear-shafts and walking sticks. As the stem is hollow and very strong, it is also used for water pipes. In some varieties a sweet juice is found, which in India is used for cooking.

Banana, (*bȧ-nä'nȧ*), the name of a fruit and also of the plant which produces it. It is thought to be a native of India, but is now grown in all tropical countries. We get our bananas largely from the West Indies and Central America. The fruit is grown extensively in our island possessions, and some is produced in Florida, Louisiana and California. There are many varieties; the one commonly exported is the Martinique, which shows a large bunch of yellow fruit. A delicious variety is the apple banana, a small banana with fragrance and taste of the apple. In Hawaii, just in the home garden of the sugar planter, may be grown fifteen different kinds. Common in tropical countries is a popularly called cooking banana, not edible raw; with thick, salmon-colored flesh and dark skin, similar to the plantain of the South Seas. It is told that the natives of one of the South Sea islands subsist entirely on bananas; on many islands it is the main food. Between the plantain and the banana there is little, if any, botanical difference. Both are *Musa sapientum.* The plantain, a much less familiar fruit, is large, solid and mealy compared with the ordinary banana. The banana is very nutritious and wholesome when thoroughly ripe. The bunches are cut off when green; those for export, so they will ship well; those for home use, to keep them from the birds. They are often hung from the beam of the veranda to ripen. Some bunches grow to enormous size, one occasionally weighing 80 pounds. A small area of land will produce a rich crop.

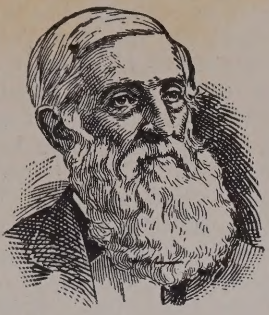
A plant bears but a single bunch, then the stalk is cut down and the sprouts take its place. When about three feet high, these are transplanted, put far enough apart to allow space for the great leaves that will outspread wide when full grown. The plant or tree varies in height from 10 to 40 feet, and at the top of the stalk the immense, undivided leaves are from six to ten feet long and one to two feet wide. The flower-bearing is most curious; the flower cluster with its tight-overlapping scales is a great elongated purple bud in appearance. Under each scale is a true flower of which there may be over a hundred in each "bud," forming that many bananas as they develop. Under favorable conditions a banana plant bears when from twelve to eighteen months old. Bananas grown for their fruit are perpetuated by root-cuttings, by sprouts and suckers.

Ban'croft, George, a distinguished American historian, was born in Worcester, Massachusetts, in 1800. He graduated from Harvard College, and studied two years at Göttingen, Germany. He was tutor in Greek at Harvard for one year, and with a fellow student carried on a school in Northampton



BALTIMORE ORIOLES AND NEST

till 1830. The first volume of his *History of the United States* was published in 1834, and two other volumes soon followed. The next five volumes came out from 1852 to 1860, and in 1866 and in 1874 two more volumes were published, which bring the history to the preliminary treaty of peace with Great Britain in 1782. Two other volumes, on the formation of the constitution, appeared in 1882. Bancroft was collector of the port of Boston under President Van Buren; under President Polk he was secretary of the navy and minister to England. In 1867 he was appointed minister to Berlin, where he remained until recalled at his own request in 1874. He died at Washington, D. C., Jan. 17, 1891.


GEORGE BANCROFT

Bancroft, Hubert Howe, an American historian, was born at Granville, Ohio, in 1832, and settled in San Francisco, where, in the book business, he made a large fortune. He collected a library of 60,000 volumes, mainly on early American history. He was so fortunate as to secure the library of the Mexican Emperor Maximilian. His well-known work in five volumes, *The Native Races of the Pacific States*, forms the first part of his immense *History of the Pacific States of North America*, complete in forty volumes.

Banff. A charming and very fashionable summer resort on the main line of the Canadian Pacific Railway, 922 miles west of Winnipeg and 560 miles east of Vancouver. Famous for its hot sulphur springs and grand majestic scenery. The Rocky Mountains National Park of Canada is at Banff. The journey from Winnipeg to the Pacific coast is generally broken at Banff.

Bangalore′ (*băn′gȧ-lōr′*), a strongly fortified town of Mysore, one of the native states in India, in a district of the same name. When Mysore was occupied by England in 1831, Bangalore was made the capital, and when, in 1881, Mysore was restored to the rule of its native prince, the district of Bangalore was exempted from native control. The city lies 3,000 feet above the sea, and is consequently very healthy. Silk and carpets are the principal manufactures. Population 189,485. The district of Bangalore has a population of 669,139.

Bangkok′, the capital of Siam, situated on both banks of the Menam. One third the population are Chinese, who control the large trade of the city. For the right to trade there the Chinese pay a poll-tax of about three dollars every third year, which exempts them from the half-yearly military service which all other foreign residents have to give. A large number of the houses are built on rafts in the river. They are made of bamboo boards, wicker work or palm leaves, usually with a veranda in front and a wing at each end. On land the houses are raised on piles six or eight feet from the ground and reached by ladders. The walls of the city are about six miles in circumference. The traffic of the city is carried on mainly by canals, there being only a few streets. Bangkok is the residence of the king of Siam. The palace is surrounded by a high wall, nearly a mile long, which incloses temples, public offices, a theater and accommodation for several thousand soldiers and for about 3,000 women, 600 of whom are the wives of the king. The temples of the city are very numerous, decorated in the most gorgeous style and served by 20,000 priests. The chief exports are rice, sugar, pepper, hides, ivory and feathers, while the imports are tea, silk, opium, hardware, machinery and glassware. The building of steamships, the introduction of gas into the royal palaces and the houses of the noblemen, the starting of a regular mail to the city in 1884, followed by Siam joining the International Postal Union in 1885, show the recent progress. A railway is now running from Bangkok to Paknam (14 miles in length), while one runs from the capital to Korat (165 miles); there are also electric tramways now in the kingdom. Telegraphs connect Bangkok with Burma and Cambodia. Population is 628,675.

Ban′gor, a city and port in the state of Maine, on the Penobscot River, about sixty miles from its mouth. The harbor is accessible during the open season to all except the very largest shipping vessels. Bangor is one of the largest lumber stations in the world. About 200,000,000 feet are yearly shipped during the season of eight months. The city has some shipbuilding, several sawmills, furniture factories, foundries, etc. When under the English government it was called Kenduskeag. Its present name was derived from the well-known tune of that name. Population, 24,803.

Bangs, John Kendrick, (1862), American humorist, born at Yonkers, New York, and educated at Columbia College. He early took to literature as a profession, and has been connected editorially or as a writer with *Harper's Weekly* and *Magazine*, with *Life*, the *Metropolitan Magazine*, etc. He has written a number of amusing and entertaining books, among the best known of which are *A Houseboat on the Styx*, *The Pursuit of the Houseboat*, *Mr. Bonaparte of Corsica*, *Coffee and Repartee*, *Uncle Sam, Trustee*, *The Idiot at Home*, *The Bicyclers and Other Farces*, *Toppleton's Client*, *A Rebellious Heroine*, *Olympian Nights* and *The Enchanted Typewriter.* He died 1922.

Banks (from the Italian *banco*, meaning a bench). The Babylonians and Chinese as well as the Greeks and Romans are known to have made use of the principles of banking; but the bank of Venice in the 12th century was the first institution which carried on banking business as it is now practiced. The bank of Barcelona was founded in 1401; and one at Genoa, started in 1407, was for centuries one of the first banks in Europe. The bank of Amsterdam (1609) was the great warehouse for bullion during the 17th century, giving receipts for the coin and bullion put there, which receipts were used as money.

Modern banking begins with the 18th century, and the modern bank in its simplest form is an institution which receives money from its depositors and loans it out to borrowers, charging the latter interest for the loan. The difference between the higher rate of interest which the bank charges the borrowers and the lower rate which it pays its depositors is the gross profit which the bank makes.

The money which the bank loans is represented in the bank by notes, which are promises to pay back the money at a certain time and place, signed by the borrowers. In order that the bank may safely loan money it requires the borrower to give security. This may be in the form of an endorsement which is the signature of a person, firm or corporation on the back of the note, and this endorsement makes the endorser guarantee the payment of the note and interest. Other forms of security are stock, bonds, mortgages, etc. If the borrower fails to pay the note when it is due, the bank can then sell the stock, bonds, mortgages, etc., and apply the proceeds in payment of the note.

In the United States banks may be divided into national banks, state banks, trust companies, savings banks and private banks. National banks are organized and operated under the national banking laws, and are examined by national bank examiners who are under the Comptroller of the Currency in Washington, D. C., and make their reports to him. National banks are also required to make sworn statements of their condition to the comptroller whenever he calls for them. State banks, savings banks and trust companies are organized and operated under the banking laws of the states in which they are located. They are subject to examinations by state bank examiners and must make sworn statements of their conditions when the proper state official calls on them to do so. Private banks are not organized under the national or state banking laws and are not subject to the supervision of federal or state officials. When a bank is organized under the national or state banking laws, it is known as a chartered bank, because the national or state government gives the owners of the bank, known as stockholders, a charter which authorizes them to conduct a banking business.

The stockholders supply the money to start the bank, and this money is called the capital of the bank. As the bank prospers, it lays aside a certain amount of its net earnings each year in a fund called surplus. Some banks have a surplus larger than the capital. The capital and surplus belong to the stockholders; but if for some cause the bank should fail—that is, be unable to pay back to the depositors the money they had deposited, then the public authorities take the capital and surplus to pay the depositors what is owing them. If this is not sufficient, an assessment is made on the stockholders, sometimes for as much as the par or face value of the amount of stock they own.

Stockholders of a bank meet each year and elect directors to represent them in the management of the bank. The directors in turn elect the officers of the bank to whom they delegate authority to operate the bank. It is the duty of the directors to see that the bank is properly managed and that the officers conduct the bank's business carefully, safely and properly and with profit, for unless the bank makes a profit it cannot pay dividends upon its stock. A dividend is a division of the net profits of the bank among the stockholders in proportion to the amount of stock each holds and is designated as a percentage of the capital. Thus, if a bank pays 10 per cent. dividends, it divides each year among the stockholders an amount of money equal to 10 per cent. of its capital stock. The par or face value of the stock of national or state banks is $100. Its real value is what it sells for. The stock of some banks is worth many times its par or face value.

The first chartered bank in this country was the Bank of North America. The charter was granted by the Congress of the Confederation in 1780. Because there was some doubt as to the power of Congress to do this, the bank was rechartered by Pennsylvania in 1781. In 1784 the Bank of Massachusetts and the Bank of New York were organized. In 1791 Congress established the Bank of the United States; the charter was limited to 20 years. The capital was $10,000,000 one fifth of which was supplied by the government. The headquarters of the bank was in Philadelphia, with branches in other cities of the country. When the charter expired in 1811, Congress refused to renew it. In 1816 the second United States Bank was chartered by the government with a capital of $35,000,000 of which the government subscribed one fifth. This bank was used as a depository for government funds, and five of its 25 directors were appointed by the government. In 1832 Congress passed an act renewing its charter, but President

Jackson vetoed it. The bank became a great political issue, and President Jackson ordered the public funds to be removed from the bank and deposited in state banks. In 1836 the bank's charter expired, but a few days before this occurred Pennsylvania gave it a state charter and it became the United States Bank of Pennsylvania. Between 1836 and 1863 only state banks existed in the United States.

The several state banking-systems, no two alike, caused great dissatisfaction and losses. Each state had its own banking laws and under them the state banks issued currency. The laws were so loosely drawn that suspensions and failures were frequent. In many instances the privilege of issuing notes to circulate as currency was grossly abused. This led Secretary Chase in 1861 to suggest a national-bank Act, and in 1863 such an Act was passed by Congress and became the basis of the present national banking laws. Congress in 1865 levied a tax of ten per cent on all circulating notes other than those issued by national banks, and this prohibitive tax put an end to state-bank currency.

National banks can issue their own bank-notes to circulate as currency by depositing United States bonds with the Comptroller of the Currency. The bank can issue notes to an amount equal to the bonds so deposited but not to exceed the amount of the bank's capital stock. Thus a national bank, having a capital of $1,000,000, can issue $1,000,000 national bank-notes, provided it deposits $1,000,000 United States bonds.

Any five citizens of the United States can organize a national bank. In towns or cities of less than 3,000 population a national bank with but $25,000 capital can be organized; where the population is between 3,000 and 6,000 the capital stock must be at least $50,000; between 6,000 and 50,000 population the capital must be at least $100,000 and over 50,000 population the capital must be at least $200,000.

In May of 1908 Congress enacted what was known as the Emergency-Currency Law. Under the provisions of this law ten or more national banks, each having an unimpaired capital and surplus of not less than 20 per cent. of its capital stock, all of the banks having a total capital and surplus of at least $5,000,000 were allowed to form a National Currency Association for the purpose of providing for an issue of emergency currency in times of financial stress or panics. Any bank belonging to a National Currency Association could use stocks, bonds or commercial paper (the notes of commercial houses) which had been approved by the association as a basis for additional circulation. To secure this emergency currency from the government through the currency association, the bank must meet certain requirements and do certain things laid down in the law but always under the direction and control of the Secretary of the Treasury. The law expired by limitation on June 30, 1914.

FEDERAL RESERVE BANKS

The extraordinary growth of the United States in all ways made it more and more apparent that although the National Banking System had been successful in an earlier day, it no longer filled the requirements of the country, especially on account of its lack of elasticity. After much agitation and discussion a new banking and currency measure was passed by the Democratic majority in the Congress and became law upon being signed by President Woodrow Wilson on December 23, 1913. This law is known as the Federal Reserve Act. The organization was perfected under its provisions and the Federal Reserve banks were officially opened on November 14, 1914.

There are twelve Federal Reserve Banks, situated in the following cities: Boston, New York, Philadelphia, Richmond, Atlanta, Cleveland, Chicago, St. Louis, Minneapolis, Kansas City, Dallas, and San Francisco. There are also twenty-four branches and two agencies; these are situated in parts of large districts at considerable distance from the district Reserve Bank. Under the law, all national banks had to become members of the Federal Reserve system, and state banks were permitted to become members. Each member bank must hold stock in the Reserve Bank to the amount of six per cent of the member bank's capitalization, three per cent paid in and three per cent subject to call.

Under the provisions of the Act, the Federal Reserve Board was established in Washington. Its purpose is to give cohesion to the entire system. It is composed of eight members: the Secretary of the Treasury, and the Comptroller of the Currency, *ex officio,* and six others appointed by the President with the advice and consent of the Senate. These latter members hold office for ten years, and their salaries are for each $12,000 a year.

Each Federal Reserve Bank is controlled by a board of nine members, three representing the member banks, three commercial, agricultural and other industrial interests, and three the Federal Government. Officers of the Bank are selected by this board, and at the head of the officers is a president or governor. The Federal Government designates one of the three members representing the Government as "Federal Reserve Agent." He also is chairman of the local board. Among his duties are responsibility for the function of note issue and the custody of commercial paper and gold held to protect notes.

Under the Pepper-McFadden Banking Act, approved February 25, 1927, the national banking laws and the Federal Reserve Act were amended. The law made provisions for the consolidation of state banks with national banking associations and for the establishment and operation of branch banks in those states permitting such procedure. The Federal Reserve Act was amended to permit the Federal Reserve Board to require any Federal Reserve Bank to discontinue any branch established under the section of the Act amended. It was also provided that charters of national banks belonging to the Reserve System, originally designed to expire in 1933, are to continue until dissolved by Act of Congress or forfeited for violation of law.

The unprecedented business and economic depression, which began with the stock market crash of 1929, changed the entire banking situation in the United States. Literally thousands of banks failed and in spite of efforts by the Reconstruction Finance Corporation and other agencies conditions continued to grow worse. On the day that Herbert Hoover relinquished the Presidency of the United States, the nation was in the throes of a bank depositors' panic, which caused every banking house in the nation, sound or unsound, to close its doors. The commodity and securities exchanges were forced to suspend; the nation's industrial structure was threatened; the normal activities of the people were halted. Nothing like it had ever been experienced before by any living American. All eyes turned to Washington. They did not turn in vain.

There was no delay. Less than twenty-four hours after Franklin D. Roosevelt took the oath of office as President, he issued two proclamations. One declared a bank holiday for the nation and placed an embargo on the export of gold. The other summoned Congress to convene in special session on March 9, 1933. When the legislators entered their chambers on that day, they found awaiting their action an Emergency Banking Law, prepared by the President and his advisers. It was introduced, passed, laid on the President's desk and signed by him on that very day. It made the President czar over the opening and closing of banks, authorized a $3,000,000,000 expansion of the currency, forbade gold hoarding, and sustained the President's embargo on exportation of gold. Four days later sound banks were authorized to reopen, and conditions began to improve.

The Glass Banking Law was enacted with little opposition in the Congress on June 13, 1933. It provided for insurance of bank deposits by a corporation financed by the Government, the Federal Reserve, and the commercial banks. The insurance is to cover deposits up to $2,500 after January 1, 1934, and deposits above that sum after July 1, 1934. The Act also required banks to divorce themselves from their security-selling affiliates within one year from the time it was made into law, and required state or federal supervision for private banks accepting deposits.

SAVINGS BANKS

France claims the credit of being the mother of savings banks, a savings bank having been established at Brumuth in 1765, but it is of record that the savings bank idea was suggested in England as early as 1697. There was a savings bank in Hamburg, Germany, in 1778 and in Berne, Switzerland, in 1787. The first English savings bank was established in 1799, and postal savings were started in England in 1861.

The first chartered savings bank in the United States was the Boston Provident Savings Institution, incorporated December 13, 1816. The Philadelphia Savings Fund Society began business the same year, but was not incorporated until 1819. In 1818 banks for savings were incorporated in Baltimore and Salem, and in 1819 in New York, Hartford, Newport and Providence.

Savings banks are organized and maintained for the conveniences of the person of small means who by making small deposits can in time accumulate a comfortable sum of money. Such banks differ widely in the conduct of their business from commercial banks. Deposits in commercial banks are subject to withdrawal without notice, but savings banks reserve the right to require from 30 to 60 days'—and in some instances six months'—notice of withdrawal of funds. Interest ranging from three to five per cent *per annum* is paid on savings deposits, but such deposits must remain in the bank for a certain period—the time varying according to the rules of the banks—before interest is allowed. If the funds are withdrawn before interest time, the depositor loses the interest.

POSTAL SAVINGS BANKS

The postoffice savings banks which were established in England in 1861 at first were tried at only a few postoffices, but later the system was extended to include all the money-order offices in the United Kingdom.

In the United States the Postal Savings System was inaugurated under Act of Congress in 1911. Within six months the number of depositors was over 8,000, and the deposits were approximately $20,000,000. Deposits bear interest at two per cent a year; principal and interest are guaranteed by the United States Government. Full information concerning the Postal Savings System can be obtained at any post office which is a depository, or from the Postmaster-General, (Postal Savings System), Washington, D. C.

TRUST COMPANIES

A trust company is a banking institution organized under the laws of a state. In some states, trust companies are not permitted to exercise all the functions of a bank; in other states, banks are permitted to perform the functions of a trust company in addition to general banking. They can act in all matters of trust as if they were human individuals. A trust company can be appointed guardian by a court for orphan children. It can manage the estate of a dead person. It can be appointed to take care of an insane person or to manage the affairs of a spendthrift.

See CURRENCY; MONEY.

Bankruptcy, failure in business, incapacity to pay one's debts. Voluntary bankruptcy occurs when a debtor asks to be declared a bankrupt, involuntary bankruptcy when his creditors asked it. The U. S. Congress has authority to enact bankruptcy laws. The states may do so also, but a federal statute supersedes that of a state. In 1898 the Congress enacted a bankruptcy law, which was amended in 1926 and in 1933. A debtor commits an act of bankruptcy either by becoming unable to pay or by attempting dishonestly to alienate his property. When a petition is filed and approved, the court orders the property put under control of a trustee or receiver. It is his duty to convert the bankrupt's property into cash and distribute it proportionately among the creditors. When this has been accomplished, the debtor is discharged and released from his old debts.

The ancient Roman law against bankruptcy regarded it as a crime, so that the creditors might sell the debtor into slavery or divide his body into pieces. An English act of 1622, again, condemned a debtor who failed to show just reason for being unable to pay his debts to have one ear nailed to the pillory and afterwards cut off. The mildness of recent laws against bankruptcy is not only due to a more humane spirit, but also to the great complexity of modern business, which may cause a man to become bankrupt to a greater degree than formerly through no fault of his own.

Banks, Nathaniel Prentiss, an American general, born in 1816 at Waltham, Massachusetts. He studied law and was elected to the state legislature, being made speaker of the house in 1851. He was elected to Congress in 1852, but being opposed to slavery left the Democratic party. In 1854 he was again sent to congress by the Republicans and Know-nothings, and was chosen speaker of the house in 1856. He was governor of Massachusetts from 1857 to 1860. Soon after the outbreak of the war he was given command of an army corps on the Potomac. In 1862 he succeeded General Butler in the command of the Department of the Gulf. In 1863 he captured Port Hudson with 6,000 prisoners, which effected the opening of the Mississippi River, and in 1864, with Admiral Porter in charge of a gunboat fleet, he led an unsuccessful expedition up the Red River, and was there relieved of his command in May, 1864. He was a member of Congress from 1864 to 1870 and again from 1874 to 1876, and was re-elected in 1888. He died Sept. 1, 1894.

Banks of Newfoundland, The, extending for a length of some six hundred miles, are famous for their cod fisheries. Other fish are also abundant on the Banks; and it may be said that Newfoundland depends almost entirely upon its cod, seal and herring industries. The Banks are believed to have been gradually formed through the melting of icebergs, which here come into contact with the warm waters of the Gulf Stream and deposit the earth and stones which they may have carried from Arctic shores.

Ban'nockburn, a Scottish village on the stream of that name. It is noted for the great battle fought there in 1314 between the English under Edward II, with 100,000 men, and the Scotch under Robert Bruce, with 30,000, in which the English were completely defeated, losing nearly 30,000 men. The stone on which Bruce is said to have fastened his standard is still to be seen, and near it a flagstaff, 120 feet high, was erected as a memorial.

Ban'yan or **Banian,** a tree of India and tropical Africa, remarkable for the great branches which it sends down to the earth, and which take root again, forming new trunks. In this way the tree spreads over a great surface and lasts for many ages, though the original trunk may decay. One has been described as having 350 trunks as large as oak trees and more than 3,000 smaller ones. It grows from seventy to a hundred feet high. Alexander Campbell is said to have once sheltered 7,000 men under a banyan. Great numbers of birds and monkeys live in the tree and eat its fruit,—a kind of fig. The Brahmans hold the tree in great reverence.

Barba'dos, the most eastern of the West Indian Islands, to the eastward of the Windward Islands. It is twenty-one miles long and fourteen and one-half miles broad. It contains 166 square miles, or 106,470 acres, of which about 100,000 are cultivated. The island is almost surrounded by coral reefs. The highest point of land is Mount Hillaby, which is 1,104 feet above the sea. The climate is very healthy, but the people are in constant danger from hurricanes, which destroy an immense amount of property and many lives. One storm, in 1780, killed 4,326 persons and swept away about $6,000,000 worth of property. Since the suppression of slavery in the island in 1834, its prosperity has greatly increased. The population is 199,542, a large part of which is colored. England first settled the island in 1625, and it still belongs to her. The capital is Bridgetown (population, 33,000).

Barbarossa. See Frederick I.

Barbaros'sa (meaning Red Beard), three brothers, natives of Greece, who, as Turkish pirates, were the terror of the Mediterranean Sea during the first half of the 16th century. One of them murdered the chief men in Algiers and seized the town, but was captured in 1518 and beheaded. His younger brother took his place in Algiers, and, putting himself under the protection of Turkey, conquered Tunis for her. He defeated the Christian nations several times in sea-fights, and helped the French to take Nice in 1543. With thousands of captives he returned in triumph to Constantinople, where he died in 1546.

Bar'bary States, a large region in northern Africa, comprising modern Barca, Tripoli Proper, Fezzan, Tunis, Algeria and Morocco. In ancient times the countries included in it were called Mauritania, Numidia, Africa Proper and Cyrenaica. It is divided by the Atlas Mountains, and stretches from Egypt to the Atlantic Ocean and from the Mediterranean Sea to the Desert of Sahara. The whole or parts of it have been conquered at different times by the Romans, Vandals, Arabs, Turks and French. Excepting the French and other Europeans, the inhabitants are mostly Mohammedans.

Barca, known also as **Benghazi,** a Turkish vilayet in Tripoli-in-Barbary, projecting into the Mediterranean, opposite Greece and the island of Crete, and having to the south of it the Libyan Desert. It is flanked on the east by Egypt and the mouth of the Nile River, and on the west by Tripoli, the Gulf of Sidra and Algeria. In early days the region was the Dorian colony of Cyrene, subsequently captured and pillaged by the Persians. Later on it became a province of Greece, but, declaring itself independent, it was invaded and conquered in A. D. 641 by the Arabs. With Tripoli it fell under Turkish dominion, and in 1835 the entire region was proclaimed a Turkish vilayet; though, forty years subsequently it was placed under a separate administration directly responsible to the Porte. The country is in the main arid and sandy, with a few elevations, together with fringes of arable and pasture land, where barley and wheat are grown, cattle and sheep are bred, and fruits, including dates, olives, oranges and lemons, are grown. Sponges also are among its exports, besides goat-skins, ostrich-feathers, ivory and the produce brought by caravans from the Libyan Desert and the Sudan. Arabic is the tongue commonly spoken in the district, though the official language is Turkish. The population of Barca or Benghazi is 320,000 to 520,000, mostly Berber, though Jews are numerous.

Barcelo'na, the most important manufacturing city in Spain, and next to Madrid in size, is situated on the Mediterranean Sea. It is divided into the old and new towns by a beautiful promenade called *La Ramble.* It has a Gothic cathedral 600 years old, a university, public libraries, museums and theaters. It is the most important port of Spain except Cadiz. Silk, lace, woolen and cotton goods, shoes and firearms are its principal manufactures. It is a very old place, supposed to have been founded 400 years before the Romans, and rebuilt by Hamilcar Barca, the father of the great Carthaginian general, Hannibal. In 878 it became an independent city under the counts of Barcelona, but was joined to the kingdom of Aragon in the 12th century. During the middle ages it was a flourishing seaport. Ferdinand and Isabella received Columbus here, in 1493, after his discovery of America. In 1714 it was captured by the Duke of Berwick for the French after a long siege, and the town pillaged. Napoleon got possession of it in 1804, and it was held by the French till the Treaty of Paris in 1814. Barcelona is also a province of Spain, area, 2,968 square miles, population, 1,133,883. The city's population is 560,000.

Barebone's Parliament, a name applied in derision to an assembly of Roundheads summoned by Cromwell in 1653 to govern the then Puritan England after turning out the "Rump" of the Long Parliament. It was composed of about 140 members, and received from the Cavaliers its nickname of Barebone's Parliament from the name of an officious member, Praise-God Barebone, a leather merchant of Fleet Street, London. The assembly, though composed in part of many responsible and capable as well as godly men, proved rather unmanageable, and as it began to originate laws of a more or less radical order, which the Lord-Protector deemed beyond the legitimate province of the assembly, Cromwell ordered its dissolution after many of the body had personally surrendered their vested power into his hands. The Parliament lasted from July 4th to Dec. 12th, 1653, and in spite of its wittily applied name it enacted several wise measures of reform. Before resigning as a body, it named a new Council of State, and this council proceeded to draft a constitution, historically known as the Instrument of Government. Under this instrument Cromwell was made Lord-Protector of the commonwealth, and was given a council of twenty-one members, by whose advice he was to be guided in foreign and domestic affairs.

Bar Harbor, a famous summer resort, is situated on Mt. Desert Island off the coast of Maine. This island, the largest on the New England coast, was discovered by Champlain who named it *L'Isle des Monts Deserts* or the isle of the desert mountains. In its area of 100 square miles there are fifteen mountains from 700 to 1,500 feet above the sea level, and as many beautiful lakes from a few acres to several square miles in area.

Bar Harbor has a permanent population of 5,000. In the summer this is increased to 12,000 or more. It contains several large hotels but is becoming more each year a city of magnificent summer residences which are popularly known as cottages. These are occupied during the summer by members of some of the wealthiest and best known families of the large cities. In addition to its natural attractions of mountain, lake and shore, Bar Harbor has many public improvements including fine roads, bridle paths, excellent drainage, an abundance of pure water, electric lights and unusual railroad, postal, telephone and telegraph facilities.

Bark, the portion of the stems of trees and shrubs outside the wood. Sometimes extended by analogy to the cortex of herbs, especially of such as the flax, hemp, etc., which contains textile fibers. In spring, this part is usually easily separable from the wood, because young cells which are easily ruptured are forming at the juncture of the two. (See CAMBIUM.) In Europe (and consequently in English translations of German books), the term bark is applied only to the dead and dry outer portions of what Americans call bark. The bark of a young twig shows three parts: the outer, corky layer, composed mainly of a dead tissue, cork; the green layer of living cells capable of food-making; the inner (often fibrous) layer concerned in the transport of foods. (See BAST.) As the bark grows older it undergoes various modifications: (1) The outer part either becomes thick and ridgy, or is sloughed off in flakes or strings. (2) The green color disappears from the middle layer or this layer also may be sloughed off; leaving (3) the inner portion alone, which, being added to yearly, consists of partly dead and partly living tissues in various proportions in different plants. Many barks are of great economic importance on account of the tannins, alkaloids, aromatic substances, etc., which they contain. The bark of several oaks and of hemlock is used in tanning leather; Peruvian bark yields quinine and other alkaloids, used as medicine; stick cinnamon is the rolled inner bark used as a spice.

Barker, Lewellyn Franklin, a native of Ontario, graduated in medicine in Toronto University in 1890. Up to 1893 assistant resident physician at Johns Hopkins Hospital, associate professor of anatomy and later of pathology in Johns Hopkins University. A member of the Johns Hopkins commission for the study of tropical diseases in the Philippine Islands in 1899. In 1900 made professor of anatomy and director of the anatomical laboratories of the University of Chicago. In 1901 he was a member of the United States government commission for the investigation of the plague in San Francisco. A double gold medalist of Toronto University. Has spent much time studying at Leipsic, Berlin, Munich and London. In 1905 appointed a professor of Johns Hopkins Hospital and School of Medicine as successor to Dr. Wm. Osler.

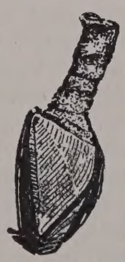
Bar'ley, a well-known grain produced by a species of the genus *Hordeum*, which belongs to the grass family. The ordinary barley is the *H. sativum*. In its cultivated form it is unknown in nature, but is commonly supposed to have originated from a wild species which is now growing from Asia Minor and the Caucasus to Persia and Baluchistan. All the cultivated forms are probably derived from this one stock.

Barmecide's Feast, an imaginary banquet, from the story, in *Arabian Nights*, of one of the Barmecide family who put a number of empty dishes before a starving beggar, giving them fine names as he did so The beggar humored the joke, pretending to eat heartily, and at last feigned to be so intoxicated with the imaginary wine that he boxed the ears of his host. The host was so pleased with the beggar's patient humor, that he set a real dinner before him at once.

Bar'men, a busy city in Rhenish Prussia. Nowhere else in Germany are so many factories found in one place. It has the largest factories for ribbon-weaving on the continent, and also manufactures lace, thread, buttons, braid, cotton cloth, silk goods, steel wares and plated goods. It is made up of a number of villages, which form almost one continuous street six miles long. Population, 169,201.

Bar'nabas, one of the early Jewish Christians, best known for his connection with the Apostle Paul, was born at Cyprus. His name was Joses, Barnabas being a surname which means son of exhortation. He was sent to Antioch to learn the truth of the story which had reached Jerusalem of the conversion of Paul, and was with him there a year, helping him in his work. They were sent together on a mission to Cyprus and Asia Minor. The people of Lystra, on this mission, called him Jupiter, and Paul, Mercury, from which it is thought Barnabas must have been large and fine looking. Nothing further is known certainly about him, though some scholars think he wrote *Hebrews*. The Gospel of St. Barnabas in Arabic is not considered his writing. The Roman Catholic church observes the 11th of June as St. Barnabas's day.

Barnacle. Among the most common objects at the sea-coast are the acorn-shells, attached to rocks, and other forms of barnacles attached to the piles supporting wharves and other submerged objects. These animals possess a shell, but are not related to the clams, oysters and sea-snails: on the other hand, they are closely related to the crabs, shrimps and lobsters. In one of the common forms, the shelled animal is perched on a flexible stalk (see Fig.). This is the common ship-barnacle or *Lepas*, frequently attached to the bottom of ships. Feathery-like limbs protrude from the shell, which, by moving, produce currents in the water that bring food to the animal. These animals have a strange life-history. The females lay eggs, but the young, when hatched, do not look like the parents


BARNACLE
(*Lepas anatifera*)

they are free swimming and higher developed, and show their resemblance to the other crustacea (crabs, lobsters, etc.). After swimming freely for a time, these young forms settle down and grow firmly attached to some object in the water. Then they undergo changes that carry them downward instead of upward in the scale of life; therefore, the adults are not on as high a plane as the young. The forms growing to the rocks have no stalks. A myth of the middle ages led to the strange belief that a kind of goose-barnacle gave birth to goslins.

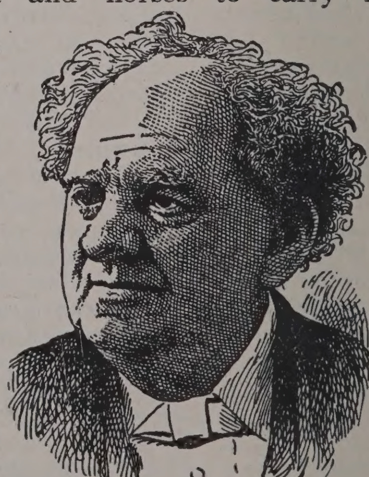
Barnard College is the institution which cares for the undergraduate women students of Columbia University. It is named in honor of President Frederick A. P. Barnard, former president of Columbia University, to whose recommendations and efforts this college owes its existence. In 1883 the trustees of Columbia College authorized the bestowal of "suitable academic honors and distinctions" upon women who had pursued successfully courses of study outside of Columbia College, but under the observation of its authorities. Women students began at once to take advantage of this privilege, and from that beginning the present college has grown. The college buildings are beautifully situated at 120th Street, Morningside Heights, New York City. It takes very high rank among institutions of advanced learning for women.

Barnard, Frederick A. P., American educator and scientist, was born in Massachusetts in 1809, and died in New York city, April 27, 1889. Educated at Yale, he occupied for a time the mathematical chair at the University of Alabama, and later on was successively president of the University of Mississippi and of Columbia College, New York. In the latter post he did admirable work, and at his death his estate was devised to it. In his honor Barnard College for women was founded as an annex to Columbia. In 1867 President Barnard represented the United States as commissioner to the Paris exposition; he was also president of the American Association for the Advancement of Science. Besides a number of works of an educational character, President Barnard published treatises on *The Metric System*, on the *Undulatory Theory of Light* and a *History of the United States Coast Survey*.

Barneveldt (*bär'nē-vĕlt*), **John Van Olden,** grand pensionary of Holland, who held an important place in the long struggle against Spain, was born in the province of Utrecht in 1547. In 1585 he was sent on an embassy to Queen Elizabeth of England, and on his return was made advocate-general of Holland. He became the head of the republican party, and opposed the warlike tendencies of Prince Maurice, who then was stadtholder. In 1609 he secured peace with Spain. He was in favor of the more tolerant of the two parties in Holland, called the Remonstrants or Arminians, while Maurice sided with the other, called the Gomarites. Barneveldt tried to bring about an agreement between them in religious matters, but his enemies claimed that he was acting secretly in the interest of Spain. In 1618 he was illegally tried and convicted of treason, though his country really owed its political existence to him. He was beheaded at The Hague in May, 1619. His story is well known to American readers through the *Life and Death of John of Barneveldt*, written by the historian Motley.

Bar'ney, Joshua, an American commodore, was born at Baltimore, Maryland, in 1759. After distinguishing himself in several engagements and being imprisoned in England, he was appointed captain of the famous ship *Hyder Ali*. In 1782 he captured the British ship *General Monk*, for which he received the rank of commodore. After the Revolution he was for a time in the French navy. In the War of 1812 he commanded a fleet of gunboats, and also distinguished himself at the defense of Washington. He died at Pittsburg, Pa., in 1818.

Barnum, Phineas Taylor, American showman, was born at Bethel, Connecticut, July 5, 1810. He began business at thirteen years of age as clerk in a country store, then was in the lottery business, and afterward edited a newspaper in Danbury, Conn., where he was imprisoned sixty days for libel. In 1834 he bought in New York a colored woman, said to have been the nurse of Washington, and exhibited her as Washington's nurse. In 1841 he got hold of Scudder's museum in New York, which soon became famous. Here he exhibited the famous dwarf, General Tom Thumb, whom he afterward showed through Europe. In 1849 he induced Jenny Lind to sing in New York and other cities at $1,000 a night for 150 nights. The tour was successful, Barnum receiving $700,000 from the sale of tickets at auction. In 1871 he organized a museum, menagerie and circus, which took 500 men and horses to carry it through the country. This he enlarged in later years until it required a hundred railroad cars to transport it. In 1879 he said that 90,000,000 people had visited his show, and the number enormously increased in later years. Mr. Barnum was well known as a benevolent



PHINEAS T. BARNUM

man and also as author of several books—an *Autobiography* (1854), *The Humbugs of the World* (1865), *Struggles and Triumphs* (1869) and *Money-getting* (1883). He died at Bridgeport, Connecticut, April 7, 1891.

Baro'da, a city of Hindostan. It is 250 miles north of Bombay, with which it is connected by railroad. It is the residence of the Gaikwar, a Mahratta prince. It has several Hindu palaces and temples and the court of the state to which it belongs. Its trade is considerable. Baroda is also one of the feudatory or native states in British India (area 8,099 square miles, with a population of 1,972,600). Population of the city, 103,790.

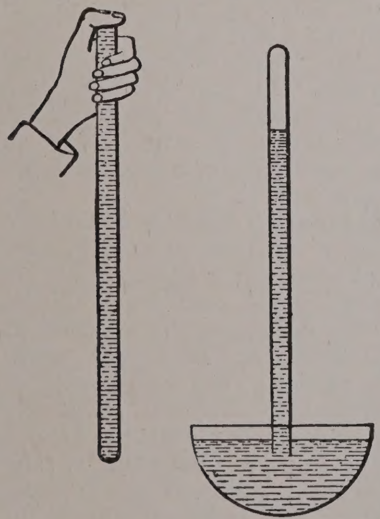
Barom'eter, an instrument for measuring the pressure exerted by the earth's atmosphere. It consists simply of a U-tube, one end of which opens into the earth's atmosphere, the other into a vacuum, the intermediate portion of the tube being filled with a liquid, usually mercury.

To clearly understand the barometer, we must recall that at the beginning of the 17th century the two following facts were supposed to be entirely independent, namely, (1) the fact that "nature abhors a vacuum" and (2) the fact that the air has weight. It was Torricelli (born in 1608, died in 1647), who first showed that "nature abhors a vacuum *because* the air has weight."

(1) MERCURIAL BAROMETER.

He illustrated this by taking a tube. more than 76 centimeters long and closed at one end, which he filled with mercury, as indicated in the figure. Placing his finger over the open end, he inverted the tube in a dish of mercury. The column of mercury fell a short distance, but remained standing in the tube approximately at the height of 76 centimeters above the surface of the mercury in the dish.

Torricelli thus showed that the weight of the earth's atmosphere is approximately that of an ocean of mercury covering the entire earth to the depth of 76 centimeters. But if this be the fact of the case, Torricelli argued that the height of the mercury in the inverted tube should diminish as one ascends in the earth's atmosphere. This test was shortly made by Pascal, who carried the inverted tube to the top of a mountain in France, and found that the mercury fell some seven or eight centimeters in the ascent. Such a dish of mercury and inverted tube is called a *mercurial barometer.* The vertical distance between the two surfaces of mercury, one in the tube, the other in the dish, is called the *height of the barometer* or, sometimes, the *reading of the barometer.* Ordinary barometers are furnished with graduated scales by which this height can be easily read.



TORRICELLI'S EXPERIMENT

In general the height of a barometer depends upon two factors: (1) the height of the atmosphere and (2) the average density of the atmosphere. Anything which changes either one of these will change the reading of the barometer.

Water vapor, when under the same pressure as air, has a density which is less than that of air. If then there be much water vapor in any portion of the earth's atmosphere, its density will be diminished and the mercury column which it supports will become shorter. The barometer is said to fall. But the same thing happens when the *height* of the atmosphere is changed or when its pressure is altered by cyclonic motion. The barometer is *not*, therefore, an instrument for telling whether or not it is about to rain; but for measuring the pressure of the earth's atmosphere. The readings of the barometer are, however, exceedingly useful, *as one factor*, in predicting the weather.

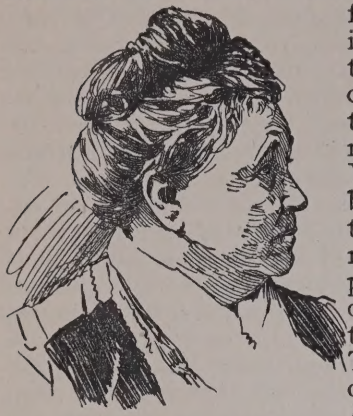
(2) ANEROID BAROMETER.

Since the mercurial barometer is not easily portable, geologists and travelers generally use a smaller form based upon the same principle as the ordinary steam gauge It consists essentially of a hollow cylinder made of thin sheet-metal and bent into a circular form. After the air has been partially removed from this cylinder it is hermetically sealed. As the pressure of the air outside diminishes, the metallic vessel tends to uncoil from the circular into a straight form. By a system of levers this motion is communicated to an index moving over a dial from which the barometric height can be read. Such an instrument is called an *aneroid barometer.* This is not nearly so reliable as the mercurial barometer; but when it is used with care and frequently compared with a mercurial barometer, it is exceedingly convenient for measuring altitudes. Hough, Hipp and others have invented excellent self-registering barometers.

Boudin of Paris makes a delicate thermometer which by changes of boiling-point of water will indicate differences of altitude as small as 30 feet. Such an instrument is equivalent to a barometer and is called a *hypsometer.*

Barr, Amelia Edith (Huddleston), Anglo-American novelist, was born at Ulverston, Lancashire, England, March 29, 1831, and was educated at the High School at

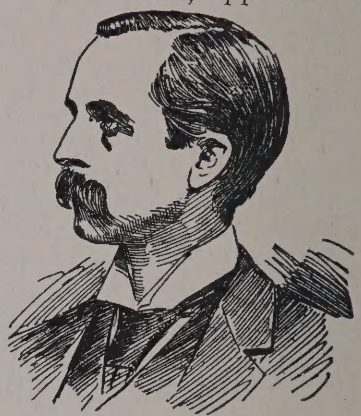
Glasgow, Scotland. In 1850 she married Wm. Barr, and four years later they came to this country and settled in Texas, where the husband and three children died of yellow fever at Galveston in 1867. With her three remaining children (daughters), Mrs. Barr removed to New York, where she began to write for the religious periodicals and to publish a series of semi-historical tales and novels. The more popular of the latter are *A Bow of Orange Ribbon*, *Jan Vedder's Wife*, *A Daughter of Fife*, *Friend Olivia*, *Beads of Tasmer*, *Sister to Esau*, *A Rose of a Hundred Leaves*, *The Lone House* and *Prisoners of Conscience*. She has also written *Romance and Reality*, *The Hallam Succession*, *Young People of Shakespeare's Time*, *A Border Shepherdess*, *Bernicia*, *Feet of Clay*, *Remember the Alamo* and a number of other stories. She died in 1919.


AMELIA E. BARR

Barre, Vt., a city in Washington County, six miles from Montpelier. It is one of the most important granite centers in this country. The city has a school for young men and women, the Spaulding High School, Goddard Seminary, a public library, opera house, banks, newspapers, etc. It has the service of three railroads. Population, 10,734.

Barras (*bȧ′rȧ′*), **Paul François Jean Nicolas, Comte de,** a prominent man in the French Revolution, was born in June, 1755. He served in his youth as a soldier in India against the English, leaving the army with the rank of captain. His dissipation soon made away with his fortune, and he joined the Revolution in the hope of regaining it. He became a member of the states-general in 1789, of the national convention in 1792, and was an active opponent of the royalist party, voting for the execution of the king. He conducted the siege of Toulon, where he first met Napoleon, and put down with great cruelty a revolt in the south of France. He was active in overthrowing Robespierre in 1794. In 1795 he was appointed general-in-chief, and by calling Napoleon Bonaparte to his aid put down the rebellion which was just starting. About the middle of 1794 he became dictator, but his love of pleasure made him unpopular, and he had to yield to Napoleon in 1799. His later years, until his death in 1829, were spent in conspiracies against the government.

Barrie, Sir James, greatest of modern Scotch novelists made a baronet in 1913, was born at Kirriemuir ("Thrums"), a little Forfar weaving town, May 9, 1860, and educated at Dumfries Academy and at the University of Edinburgh. He began his literary career as a leader-writer on a newspaper in Nottingham, England, then became a journalist in London, contributing under the pen name of Gavin Ogilvy to the *British Weekly*, the *Speaker* and the *National Observer*. His first book, *Better Dead*, a satire on London life, appeared in 1877, and was followed by two more important and far more successful works, *Auld Licht Idylls* and *When a Man's Single*. These were followed by *A Window in Thrums* (1889), which won fame for the novelist; after which appeared *An Edinburgh Eleven*, *My Lady Nicotine*, *Sentimental Tommy* and a memoir of his mother, *Margaret Ogilvy*. His first long story now appeared, *The Little Minister*, in which he shows himself the literary artist. In 1892 appeared a comedy, *Walker London*, which enjoyed a phenomenal run. Tender sympathy and shrewd humor, mark his style. His later works, beside a dramatic version of *The Little Minister*, also very successful on the stage, are *The Professor's Love Story*, *Tommy and Grizel*, *Peter Pan* and *Alice-sit-by-the-fire*.


JAMES M. BARRIE

Barrie, county seat of Simcoe County, Ont., is a pleasant city of 6,575 inhabitants, situated 839 feet above the sea on the north side of Kempenfeldt Bay (Lake Simcoe). The Grand Trunk Railway runs through it, and here starts the Lake Simcoe steamer, traversing a beautiful body of water 30 miles long and 26 wide. In the vicinity was fought that war in which the Iroquois Indians completely destroyed the power of the Hurons. The summer temperature makes the spot a favorite resort.

Barrows, John Henry, president of Oberlin College, Ohio, and a minister of the Presbyterian church, was born at Medina, Mich., in 1847, and in 1867 graduated from Olivet College, Mich. He subsequently studied at Yale, Union and Andover theological seminaries, and from 1881 to 1895 was pastor of the First Presbyterian Church, Chicago. During the Columbian exposition (1893) held in that city, he was chairman of the general committee on religious congresses. In 1896 he resigned his pastoral charge in Chicago and proceeded to India, to lecture on religious subjects under the auspices of the Haskel endowment of the University of Chicago. On his return he became lecturer at the latter on Comparative Religions, and was also lecturer at Union Theological Seminary, New York. He is the author of a *History of the Parliament of Religions;* a *Life of Henry Ward Beecher; Christianity, the World Religion;* and *The World Pilgrimage.* Died June 3, 1902. His daughter has since published a biography of him

Barry, John (1745–1803), an officer of the United States Navy, the first senior officer of the service to have the rank of commodore conferred upon him after the reorganization of the American Navy in 1794. Born in Wexford County, Ireland, he early began to follow the sea as a profession, first as master of a trading ship and subsequently, after coming to America and settling in Philadelphia, as an officer of the United States Navy. In the Revolutionary War he was given command of the *Lexington*, in which he made some captures of English vessels; while after being transferred to the command of the frigate *Effingham* he captured an English war schooner in the Delaware River, and in the winter of 1776–77 he assisted at the battle of Trenton. In 1787 he commanded the *Raleigh*, which was pursued by the British and driven ashore; he later on commanded the *Alliance* and in a sharp engagement he captured the *Atlanta* and the *Trepassy* and gained well-earned promotion.

Barry, William Farquhar, an American major-general and artillery officer, was born in New York city in 1818, and died near Baltimore, Md., July 18, 1879. After service in the Indian War in Florida, in the Mexican War and on the western frontier, he became chief of artillery of the Army of the Potomac in the Civil War. In 1864 he gained promotion for gallantry at the fall of Atlanta and also for distinguished service in the campaign against General J. E. Johnston. Later on he was given command of the artillery in the armies under General Sherman, and had charge of the defenses of Washington. He for a time also was in command of the artillery school at Fortress Monroe. He was one of the authors of the *Engineer and Artillery Operations of the Army of the Potomac* and of *A System of Tactics for the Field Artillery of the United States.*

Barth (*bärt*), **Heinrich,** a distinguished German traveler, was born at Hamburg in 1821. After visiting Italy and Sicily, he crossed the Mediterranean in 1845 to Tangier in Africa, and made short trips into the interior, to Tunis, Tripoli and Benghazi and then down the Nile. Soon after he extended his travels into Egypt, Palestine, Asia Minor and Greece. He published an account of his travels, called *Wanderings Along the Shores of the Mediterranean.* In 1849, with Dr. Overweg, he proceeded on an exploring journey through Central Africa. He was gone nearly six years, traveling about 12,000 miles. He published his *Travels and Discoveries in Central Africa* and a work on the *Vocabularies of Central Africa.* After other journeys in Greece, Turkey and Asia Minor, he died at Berlin, Nov. 25, 1865.

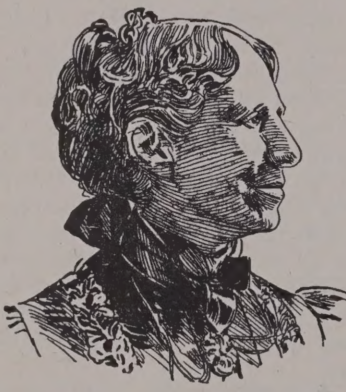
Bartholdi (*bär'tōl'dē'*), **Frederic Auguste,** a sculptor, was born in Alsace in 1834. He has made a number of famous statues. Among them are the *Lafayette* statue in New York; *Vercingetorix*, the leader of the Gauls, which is now in the galleries of the French government; *The Lion of Belfort* and *Grief.* It occurred to him in 1874 that it would be a fitting thing for France to present to America a statue in honor of American independence. The result of this idea is the gigantic bronze statue of *Liberty Enlightening the World*, which was finished in 1884, and, after two years spent in getting it into position, was unveiled on Bedloe's Island in New York harbor. Bartholdi received the cross of the Legion of Honor in 1887. He died Oct. 4, 1904.

Bartholomew Fair, held at West Smithfield, London from 1133 to 1855, its charter having been granted by Henry I to a monk. It was held yearly at the Festival of Bartholomew. In the begininng it was one of the great yearly markets of the nation, more cloth being sold there than anywhere else in the kingdom. All sorts of amusements were used to attract people to it; all kinds of shows, acrobats, stilt-walkers, mummers and merry-andrews were to be found there in great numbers. After 1685 the famous fair began to lose its trade, and came to an end in 1855.

Bartholomew, Massacre of St., the name given to the massacre of the Huguenots in Paris on the night of St. Bartholomew's Day, Aug. 24, 1572. During the youth of Charles IX his mother, Catherine de Medici, acted as regent and showed an extraordinary cruelty Pretending friendship to the Huguenots, she married her daughter Margaret to Prince Henry of Navarre, afterward Henry IV, the head of the Huguenot party, and appointed Admiral Coligni, another leader of the Huguenots, to a high office in the kingdom. Having induced all the chief members of the party to come to Paris, she secretly appointed St. Bartholomew's Day as the day for their massacre. Admiral Coligni was murdered in the palace, and the bell of the palace was rung as a signal to the citizens to begin the slaughter. Notices were sent through all the French provinces to kill all the Huguenots, and for days the bloody work went on; 30,000 people are said to have been killed. The massacre, however, did not accomplish its object, for the king was obliged soon to grant liberty of conscience to his Huguenot subjects.

Bartolini (*bär'tō-lē'nē*), **Lorenzo,** a celebrated Italian sculptor, was born in Tuscany in 1777, and came to Paris while still a young man. His chief patron was Napoleon, who sent him, in 1808, to Carrara to establish a school of sculpture. After the battle of Waterloo, he went to Florence, where he died in 1850. Besides a great number of busts, he produced several groups, of which *Charity* and *Hercules and Lycus* are the most celebrated.

Barton, Clara, philanthropist, and president of the American National Red Cross society (1881–1904) was born at Oxford, Mass., in 1830. In 1854 she entered the United States Patent office at Washington as a clerk; but at the outbreak of the Civil War she devoted herself to the humane care of the soldiers on the battlefield, and, in 1864, had charge of the army hospitals on the James River. Congress voted her $15,000 for her relief work on the field, for organizing the search for wounded and missing men, and, in the case of the dead in Andersonville cemetery, Georgia, for marking the graves of the Union soldiers. During the Franco-German War, she assisted the Duchess of Baden in establishing and organizing hospital relief, a humane work which won her the honor of decoration with the iron cross of Germany. In 1881 she became president of the American Red Cross society, and represented the United States at the Geneva conference. In connection with Red Cross operations, she did relief work during the famine in Russia in 1892; during the Armenian massacres, in 1896; and during the Spanish-American War, in Cuba, where she also did personal work in the field. Miss Barton was author of a *History of the Red Cross*, which was issued by the United States government; and of *The Red Cross in Peace and War*. She died in Washington, April 12, 1912.



CLARA BARTON

Barton, Rt. Hon. Edmund, *P. C.*, first premier of the commonwealth of Australia, was born at Sydney, New South Wales, Jan. 18, 1849, and educated at the University of Sydney. In 1879 he was elected to the legislative assembly of the colony, becoming attorney-general and member of the legislative council and taking a foremost part in the movement for Australian federation. In the new federal ministry he was made prime minister, with the portfolio of external affairs.

Bar'ye, the unit of pressure used by scientific men The numerical value of the *barye* is that of a pressure which exerts a force of one dyne upon an area of one square centimeter. This unit was adopted by the International Congress of Physicists at Paris in 1900. The mega-barye is a pressure of one million dynes per square centimeter. This is very exactly equivalent to the pressure exerted by a column of mercury 75 cm. high under standard conditions of gravity and temperature.

Barye' (*bȧ'rē'*), **Antoine Louis,** a French sculptor, distinguished mainly for his bronze statues of animals and animal groups, was born at Paris in 1795 He was at first an engraver and metal-worker. His famous bronze of a lion struggling with a snake, secured for him the cross of the Legion of Honor. He died at Paris in 1875.

Basalt, a dark, greyish-black stone of volcanic origin, a variety of up-rock, and often occurring in the form of columns, as in the columnar structures seen at Fingal's Cave, Staffa, in the Scottish Hebrides, and at the Giant's Causeway, Antrim, Ireland. From a number of still active volcanoes, such as those in Iceland and in the Hawaiian Islands, and in the case also of Etna and Vesuvius, basalt is ejected in lava-flows in a molten state, the chief constituent of the outflow being augite (pyroxene), hornblende and felspar, the latter consisting chiefly of silicate of alumina, generally hard and brittle and sometimes glassy.

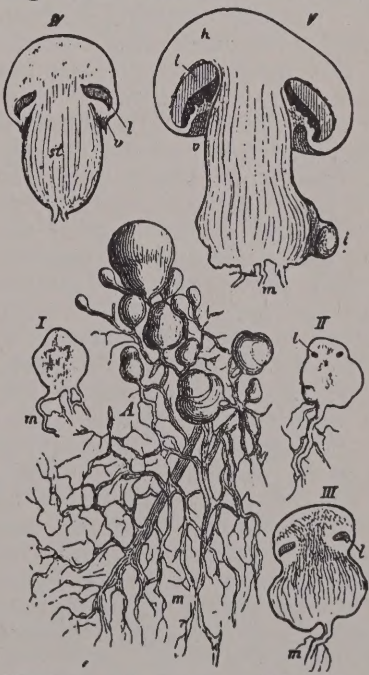
Bascom, John, American educator, and for many years president of the University of Wisconsin, was born at Genoa, N. Y., May 1, 1827. Graduating in 1849 from Williams College and six years later from Andover Theological Seminary, he was for twenty years professor of rhetoric at Williams, and for thirteen years president of Wisconsin University. He is now professor of political science at his *alma mater*, and is the author of the following works: *Political Economy* (1859); *Æsthetics* (1862); *Philosophy of Rhetoric* (1865); *Principles of Psychology* (1869); *Philosophy of Religion* (1876); *Comparative Psychology* (1878); an *Historical Interpretation of Philosophy* (1893), together with works on ethics, sociology, etc. His later works embrace *The Growth of Nationality in the United States* (1899) and *God and His Goodness* (1901).

Baseball, the national game of America, is a development from the old English game of rounders. The first club in America was the Knickerbocker, founded in New York in 1845. The game gradually grew in favor until in 1871 it had become so popular that a professional organization was formed consisting of clubs in many of the large cities. The success of this first organization has resulted in the formation of leagues including clubs in almost every city of the United States. Some of the larger cities have clubs in more than one league. Stock companies are organized to maintain these clubs and large amounts of capital invested. Professional players are paid salaries, which in the cases of those who are more expert are very large. During the season, which begins in April or May and runs about six months, some thousands of men are employed in playing professional base ball. Hundreds of amateur clubs play every year also. Every school or college has its team, and many professional ball players receive their training while playing in these clubs. Every professional league plays a championship series in which each club meets the other clubs of the league an equal number of times. Great interest is shown in the result of these games. The scores are telegraphed over the country by innings and the progress of the games in other cities announced.

A piece of ground in the form of a diamond ninety feet square is marked out on a level field of three or four acres. Bases are placed at each corner of the diamond, called home, first, second and third base. Each team has nine players, and in turn are fielders and batters. The fielders are: the pitcher, near the center of the diamond; the catcher, behind home base; the three basemen and shortstop, sometimes called infielders, the first and second basemen being between those bases and the shortstop and third baseman between second and third base; outfielders at right, center and left fields. When the fielders take their places, the pitcher delivers the ball, a fair ball being one that passes over the home plate, not lower than the striker's knee nor higher than his shoulder. Such a ball counts a strike, whether struck at or not, and after three strikes the batsman must run or be put out; but four unfair balls entitle the striker to a base. The batsman tries to knock the ball out of the reach of the fielders, so as to reach at least first base before the ball reaches the baseman, and as many more bases as he can make. Each base is a resting place, but, if he is touched by the ball between bases, he is put out. If he succeeds in reaching home plate, he scores one run. A batsman can only run on a fair hit, which is a ball batted within the lines running from home to first base, and home to third, and beyond; all other hits, even a mere tick are fouls, and a foul fly, if it is caught, puts out the batter. The batters bat in turn until three are put out, when the teams change places. When both sides have been batters once, an inning is ended, and nine innings make a game. The side scoring the most runs wins. The ball is thrown by the pitcher with great swiftness, and this high speed enables him to curve the ball in any direction, and so fool the batter into thinking an unfair ball is good or a fair ball bad. This is brought about by the pitcher's giving the ball a twist, the resisting air forcing the twisting sphere to curve from a straight line. The ball curves up or down, out or in, according to the kind of twist given by the pitcher. The game is easily understood; yet to be a good player requires not only agility, endurance and strength, together with good throwing and running powers, plenty of courage, pluck and nerve, but quick thinking, control of temper and presence of mind to act promptly at critical points of the game.

Basel (*bä'zel*), **Bâle** (*bäl*) or **Basle,** the capital of the canton of the same name, is, with the exception of Zürich, the largest city in Switzerland. It lies on both sides of the river Rhine, 43 miles north of Berne. The river is crossed by a bridge 80 feet long, which was first built in 1229. The cathedral, begun in 1010 and finished some centuries later, is still standing. The city first appears in the 4th century as a Roman military post. In the middle of the 10th century it became a free city of the empire. In 1356 nearly all its buildings were overthrown by an earthquake, and in the next century its population was greatly decreased by the plague. It joined the Swiss confederacy in 1501, and was one of the chief seats of the Reformation. There was a long contest between the city of Basel and the rest of the canton. The city claimed all the offices and rights, shutting out the country people. Peace was brought about in 1833 by separating the city entirely from the country district. The city was much more important in the middle ages than now, though it is to-day the wealthiest city in Switzerland. It has a university founded in 1460, with a teaching staff of 129 professors and 806 students. Its population is 131,914.

Basidiomycetes (*bā-sĭd'ĭ-ō-mī-sē'tēz*). A great group of low plants (*Fungi*), including such well-known forms as mushrooms, toadstools and puffballs. For the most part they are not destructive parasites, but are harmless and often useful saprophytes. The popular distinction between toadstools and mushrooms has no botanical foundation. The common cultivated mushroom, *Agaricus campestris*, may be taken as a type. The mycelium occurs in decaying leaves, wood, etc. in



STAGES IN THE DEVELOPMENT OF A MUSHROOM

the form of fine white threads, spoken of as the spawn. Upon this, little knob-like protuberances arise and grow larger and larger until they have developed into the so-called mushrooms. The mushroom has a stalk-like portion, the stipe, and an expanded top called the pileus. From the under surface of the pileus hang the radiating plates or gills. The surface of the gills is composed of a layer of peculiar cells whose broad ends are directed outward. Each one of these cells is called a basidium, and the whole layer of basidia is spoken of as the hymenium. From their blunt free ends the basidia put out minute branches, each one of which bears a spore. These spores are known as basidiospores and are formed in great abundance. In addition to the mushrooms and toadstools with gills, there are others with numerous spores lined with the hymenial layer, very common among which are the bracket fungi. The puffballs differ from the other forms in maturing their spores before exposing them. When mature, the spores are liberated by the drying and bursting of the puffball. The name of the group comes from the characteristic basidia which form the hymenial layer. See FUNGI.

Basidiospore (*ba-sĭd'ĭ-ō-spōr*) (in plants). The asexual spore of the Basidiomycetes.

Basidium (*ba-sĭd'ĭ-ŭm*) (in plants). A peculiar cell of the Basidiomycetes which produces branches upon which the asexual spores are borne. See BASIDIOMYCETES.

Basket=Ball, a modern game, dating from the year 1892 and modelled somewhat after football, though the ball (a leather-covered rubber bladder, from 30 to 32 inches in circumference and weighing from 18 to 20 ounces), instead of being kicked, is thrown or batted with one or both hands (though it may not be run with) into the basket or hammock-net receptacle, suspended on each short side of the enclosed court or oblong-shaped field, which usually covers an area free from obstruction, of from 3,000 to 3,500 square feet. The players, five in number on each side, are assigned as center and right and left guards, and right and left forwards, the guards being opposed to forwards and the centers opposed to centers. The time-contest consists of two halves of twenty minutes each, with a rest of ten minutes between. The officials, four in number, are scorer, time-keeper, referee and umpire. The playing area is usually 50 by 70 feet. The game, which was first played by members of the Young Men's Christian Association, has since become very popular, not only in athletic clubs, but in schools and colleges of both sexes. For directions as to playing and for rules, etc., see Spalding's *Basket Ball Guide* (an annual)

Basketry, the art of making baskets, is an ancient and simple yet useful and beautiful form of industry. It was known to the ancient Britons and to the Chinese; and the basket work of many of the Indian tribes of America shows a high degree of skill. Ozier or willow twigs are most suited to basketry; and are cultivated for the purpose chiefly in France, England, Germany and the Netherlands. Ash and oak may also be employed; and bamboo is used in China and Japan. The Japanese very cleverly enclose porcelain in basket work.

Basketry is one of the most useful of the arts for the purposes of the modern school. In the schools for Indians it already receives great attention; and it may be employed in the grades in such a way as to connect the actions of the children with an interest in American history and industry and in Indian and primitive life. It is fortunate for this purpose that few tools are required for the making of baskets, which is done for the most part by hand.

Basques (*bȧsks*), a curious race living on both sides of the Pyrenees. Their home forms what are called the Basque provinces of Spain, with a very small district in France. They are a farming people, though very much behind the times, using the same clumsy two-pronged wooden fork for a plow which was used by the Romans. The Basque language is unlike any other; and scholars cannot agree as to where those speaking the tongue come from or to what race they belong. Their bravery in the reconquest of Spain from the Moors won for them many political privileges, which they have kept up until very recent times. Their total number in Spain and France is about 610,000.

Bas=Relief. See SCULPTURE.

Bass, common fishes related to the perch, but now placed in a different family group, which also includes the sun-fishes or pumpkin-seeds. There are several kinds of bass. The black bass is entirely an American fish, and is among the finest game fishes of the world. Like other members of the group they prepare nests and take great care of the eggs and young. Other common kinds, all valuable as food, are the rock bass, white bass, striped bass, brass bass, etc. The last three are grouped by naturalists into a separate family. Formerly, they were all united with the perches into the perch family.

Bast (in plants), a name applied originally to the inner fibrous layers of the bark. Strictly, the term is applied to the phloem elements, such as are added year after year by the cambium of trees. This cambium is said to add new wood on the inner side and new bark on the outside. This so-called bark, which is thus added, is the bast, which, therefore, consists of fibrous elements which lie just outside of the newest wood and within the layers of cork.

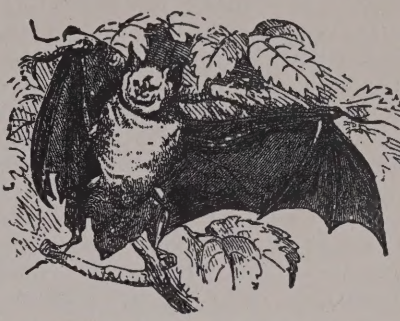
Bastiat (*băs'tyȧ'*), **Frederick,** a well-known French political economist, was born at Bayonne in 1801. In 1825 he began the study of political economy and wrote largely on the subject. He was a strong believer in the doctrine of free trade, and published several articles against the system of protection to home manufacturers. After the revolution of 1848 in France he was elected a member of the French parliament. He died at Rome in 1850.

Bastille (*bȧs-tēl′*), a famous fortress of Paris, built between 1370 and 1383 as a defense against the English. It was always used as a state prison. It would hold 70 or 80 prisoners, and during the reigns of Louis XIV and XV it was often full. The prisoners were rarely criminals, but men who had in some way offended the king and his courtiers. Authors, priests and scholars, besides political offenders, were often shut up there, and many remained so long that no one knew who they were or for what they had been imprisoned. At the beginning of the French Revolution it was attacked by the mob as a stronghold of tyranny, and after a fight the governor opened the gates and the people rushed in. The next day the prison was destroyed amid the rejoicings of the people. The fall of the Bastille was felt to be important because it seemed to mark the downfall of the old French monarchy.

Basutoland (*bȧ-sōō′tō-lănd*), is a British crown-colony in South Africa, governed by a resident commissioner under the direction of the High Commissioner. It is an elevated fertile region northeast of Cape Colony, inhabited by Basutos who rear immense herds of cattle. The population in 1911 is estimated at 404,190 natives and 1,400 whites, European settlement being forbidden. The schools, numbering 259 and chiefly conducted by missionaries, have nearly 15,760 pupils. The territory embraces 11,716 square miles, about the area of Belgium. The productions are wool, wheat, mealies and Kafir corn. Imports, consisting chiefly of blankets, plows, clothing, iron and tinware, amounted in 1910–11 to $958,500, while the exports of stock, grain and wool were $862,500. Trade is almost exclusively with Cape Colony and Orange River Colony. The governmental revenue is derived from a hut tax of one pound a year, licenses and customs rebates. For 1910–11 the receipts were $727,500; the expenditure $674,440. There is no public debt.

Bat, a flying mammal. The fact that bats have wings caused the naturalists of the middle ages to group them with the birds. But they are far removed from birds; they are mammals and bring forth their young alive.

They have remarkable power of flight, in which ease and grace are shown. Walking is made difficult by the fact that the knee bends backward. They are distributed all over the world, save in the very coldest regions. As a rule they are small, but the largest, the flying foxes of the Malay region, have a spread of wings measuring 30 inches. These and other large ones found in the East Indies and tropical Africa are fruit-eaters, doing much damage to crops; but most bats are insectivorous. In this country in the southeast we have one of the leaf-nosed or vampire bats, also one in California and Texas. Bats fly at night, and are reputed most active at dusk and just before dawn. Their voice is most unmusical, high-pitched and squeaking. During the day they hang head downward in sheltered places: caves, hollow trees, barns, church towers, deserted buildings, etc; they hibernate in the winter except in warm climates. The vampire bats are known to settle on the backs of horses and cattle and suck blood. They have been known to attack man, but it is a strange circumstance that the particular kind named vampire is not the culprit, but another related form—*Desmodus.* There are about 300 varieties of bats, but only a few kinds in the United States.



GREAT HORSE-SHOE BAT

While not the spirit of evil that superstition paints it, the bat is certainly a curious and mysterious little creature, and its looks are calculated to inspire dread. In *American Animals*, by Stone and Cram, the animal is thus described: "The wing, as a whole, corresponds exactly with the accepted idea of a devil's or goblin's wing; and the short head with its big shapeless ears, wide mouth and little blinking eyes is of just as impish and devilish an aspect." But its looks are misleading; the author goes on to say: "Bats are the most gentle and friendly of living things." Unfortunately, they have long had a bad name, and about these creatures of the night hang many a dark story and queer tradition. Children almost universally desire the instant death of any bat that presents itself. They should, on the contrary, look upon him as a sort of "night policeman." C. F. Hodge in *Nature Study and Life* so regards him, and tells of the work he does by night: "So few of our birds are nocturnal, and so many of our worst insect pests—the codling moth, tent-caterpillar moths, the white-marked tussock moth, owlet moths, parents of the cut-worms, June beetles, mosquitoes and a host of others —have taken refuge in the darkness, that we need the bat as the night police of our gardens. They should be accorded the same protection as our most valuable insectivorous birds. . . . A family of bats is a valuable acquisition to a farm or garden." The same author asserts that the bat may be easily tamed, gives interesting personal experiences with this creature of evil repute but warns one intending to tame it, to be careful at first of its sharp teeth and unfriendly attitude.

Bats drowse about twenty hours out of the twenty-four. They make no nests, but look out well for the newly born, carrying the young ones with them on their backs when flying through the air. "Blind as a bat" is but another superstition, for there is sufficient evidence that the creature's little eyes serve it well. Flitting mouse is one of the names given it in England and in Germany. See Cram and Stone: *American Animals;* pages in *Nature Study and Life,* by Hodge; Allen: *Bats of North America, Bulletin No. 43,* U. S. National Museum.

Batangas (*bȧ-tän′gäs*), a seaport town and district in the southern part of Luzon Island of the Philippines group, lying south of Manila and north of the island of Mindoro, in the south of the China Sea. The town is situated in a bay of the same name and possesses a fine harbor, into which the Calumpang River empties. Population of the town, 33,131, and of the district or province over 210,000. In the vicinity are lofty mountains, with the volcanic Mount Taal rising from them; while near by is Lake Taal or Bingabon. The city, which is well built, has a number of notable buildings, including a royal palace and convent. The province exports sugar and cocoanut oil, and has manufactures of cotton fabrics, dye stuffs, silk, etc. There are several railways with their branches on the island, together with banks, consulates, industrial and trade schools and a teacher's training institute. There also are much fine timber and considerable mineral deposits.

Bata′via the capital and chief seaport of the Dutch East Indian possessions, is situated on the coast of the island of Java. It is very unhealthy. It has been improved, however, by drainage, and most of the European inhabitants live on the higher ground of the healthy suburbs. The Dutch government has built a large harbor, a short distance away, connected with the city by railroad and canal. Batavia is one of the trading centers of the far east. The chief exports are coffee, rice, indigo, hides, oil, tea. Among the imports are cottons, woolens, silks, machinery and American ice. About half of its trade is with Holland. A telegraphic cable connects it with the city of Singapore. Population, 116,000, of whom 9,000 are Europeans.

The province of Batavia is low, but rises gently toward the south. The religion is chiefly Mohammedan. Population, nearly 1,000,000 of whom 8,000 are Europeans, 70,000 Chinese and the remainder natives.

Batavia, a city in New York, is the seat of Genesee County on Tonawanda Creek, and on the New York Central, Erie and Lehigh Valley railroads, 34 miles northeast of Buffalo and 32 southwest of Rochester. Founded at the beginning of the last century, it was incorporated as a village in 1823. It is the seat of a state institution for the blind, the Holland Purchase Land Office, a public library, and a monument to Wm. Morgan, erected by anti-Masons, in memory of one of their number who, it was charged, was abducted and, it was thought, killed in 1826 for threatening to reveal the secret of Masonry. Batavia has a number of flourishing industries, including manufacturers of agricultural implements, firearms, wooden ware, shoes, plows, blinds, sashes and carriage wheels. It also has a Roman Catholic convent. Population, 13,830.

Bateman, Newton, American educator, and for many years president of Knox College, Galesburg, Ill., was born at Fairfield, N. J., July 22, 1822, and died at Galesburg, Oct. 22, 1897. Graduating in 1843 at Illinois College, Jacksonville, he traveled extensively in the United States, and for a time was principal of a school in St. Louis; professor of mathematics in St. Charles College Missouri; and then superintendent of city schools in Jacksonville, Ill. Later on, he became principal of the Jacksonville Female Academy and, finally, state superintendent of public instruction. In 1875, Dr. Bateman became president of Knox College, at Galesburg, Ill. While state superintendent of Illinois schools, he published a number of valuable educational reports, a codification of the school laws of Illinois and a digest of the school laws and common school decisions of the state.

Bates, Arlo (1850), American journalist and novelist, born at East Machias, Maine, and in 1876 graduated from Bowdoin College. From 1880 to 1893 he edited the Boston *Sunday Courier,* while later he became a professor of English in the Massachusetts Institute of Technology. He published criticisms on the writing of English and on the study of literature, in addition to a number of works and several collections of poems. His best known works of fiction include *The Pagans* (1884), *A Wheel of Fire* (1885), *The Philistines* (1888), *The Puritans* (1889) and *Love in a Cloud* (1900). His collected verse embraces *Berries of the Brier* (1886), *Sonnets in Shadow* (1887), *A Poet and His Self* (1891), *Told in the Gate* (1892), and *The Torchbearers.* He died in 1918.

Bath, the chief city of Somersetshire, England, about twelve miles from Bristol, on the River Avon. Its houses are built entirely of white stone, and the city has probably the finest situation and appearance in England. It has long been a fashionable health resort on account of its hot mineral springs. They were known to the Romans, who built large baths there in the first century of our era, the remains of which have been discovered. There are several fine old churches, extensive buildings and beautiful parks. Richard I granted the city its charter, which was extended by George III. Population, 50,729.

Bath, Me., the capital of Sagadahoc County, southern Maine, on the west bank of the Kennebec River, twelve miles from the Atlantic, and about equidistant from Portland to the southeastward and from Augusta to the north of the city. It has a large commerce, chiefly in lumber, in machines, boilers and iron and brass work, as well as a large industry in ship-building, including battle-ships and steel steamers. It has steamboat communication with Boston. It possesses some excellent schools. Population, 18,000.

Bath'sheba, the daughter of Eliam and the wife of Uriah the Hittite. After the death of her husband at King David's instigation, Bathsheba became the wife of the latter. She was the mother of King Solomon. See II Samuel xi and I Kings i.

Baton Rouge (*băt-ŭn'roozh*), the capital of the state of Louisiana, is situated on the left bank of the Mississippi River. It was one of the earliest French settlements. The state house, state university and many other public buildings are there. The city was occupied by Federal troops during the Civil War, after the capture of New Orleans, and defended by General Williams against a Confederate force led by General Breckenridge. General Williams was killed during the contest. Population, 27,000.

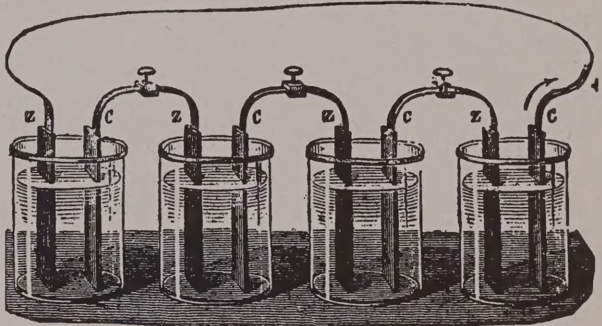
Battenberg, House of, members of a grand-ducal family reigning in Hesse, Germany, many of whom have by marriage and otherwise been connected with royalty on the European Continent and in Great Britain. The mother of the present reigning Grand-Duke of Hesse was Princess Alice of Great Britain, third daughter of the late Queen Victoria; this Grand-Duke (Ernest Ludwig) in 1894 married Princess Victoria, daughter of Duke Alfred of Saxe-Coburg and Gotha, a marriage which was dissolved in 1901. The Battenberg title was first conferred in 1857 on Countess Hanke, morganatic wife of Prince Alexander of Hesse, three of whose four children attained high honor as Princes of Battenberg. One, Louis Alexander (b. in 1854) is a British naval officer; another, Alexander Joseph, was from 1879 to 1886 Prince of Bulgaria; while the third, Prince Henry Maurice, in 1885 married Princess Beatrice, youngest child of the late Queen Victoria of Great Britain. Prince Henry, who was created a royal highness by his august mother-in-law and made governor of the Isle of Wight, died on his way home from Kumasi in 1896, having seen service in the Ashanti campaign. His widow, the Princess of Battenberg, still survives, and one of their children, Victoria Eugenie (b. 1887), married in 1906 Alfonso XIII, King of Spain.

Bat'tering Ram, an instrument of war used in ancient times. It was a beam of wood, with a head of iron or bronze, like a ram's head. It was used to batter down walls and doors, and was either carried by the soldiers or fastened in a frame and made to swing. Another kind moved on rollers. To protect those who were operating it, a wooden roof was built over it and the whole mounted on wheels. The ram varied in length from 60 to 120 feet, the head sometimes weighing over a ton, and as many as a hundred men were needed to manage it. The Romans borrowed it from the Greeks, but who invented it is not known.

Battersea, a suburb of London, on the Surrey side of the Thames, with a fine park, 185 acres in extent. Chelsea Hospital has its seat here.

Bat'tery. See ARTILLERY.

Bat'tery (electric), any combination of voltaic cells, whether used for the purpose of furnishing an electric current or merely to produce electrical pressure. For most purposes, the cells of a battery are joined up in series, that is, the positive pole of one cell is connected with the negative pole of the next cell, and so on (as shown in above cut). But if the object be to make a battery of the least possible resistance, the cells are joined in parallel, that is, all the positive poles are connected together and all the negative poles connected together, thus forming one large cell. If the object be to obtain the largest possible current, then the cells are so arranged as to make the internal and external resistances of the circuit equal.



SIMPLE GALVANIC BATTERY

Battle Creek, Mich., a city in Calhoun County, on the Kalamazoo River, southwestern Michigan, 120 miles west of Detroit and 44 miles southwest of Lansing, the capital of the state. It is located on the main lines of the Michigan Central and the Grand Trunk railroads. It has large manufactories, chiefly of farm implements, including threshing-machines, and of flour and knitting mills, a boiler works, pipe-organ factory, etc. It is the seat of Battle Creek College, controlled by the Seventh-day Adventists, and possesses an extensive sanitarium and manufactories of health-foods. Its two streams supply its factories with good water-power. The city has an admirable system of public and parish schools, and has three business colleges. The Y. M. C. A. building and the public library are the gifts of the late Chas. Willard. The late John Nichols presented the city a fine hospital. Population, 42,000.

Battleford, Saskatchewan, is a small town near the confluence of the Battle and North Saskatchewan Rivers, ninety miles by stage from Saskatoon on the northwesterly spur of the Canadian Pacific Railway from Regina to Prince Albert. It is distant 2,328 miles from Ottawa, and on the direct line of the projected Grand Trunk Pacific.

Battle Hymn of the Republic, written by Mrs. Julia Ward Howe to the tune "Glory Hallelujah," familiarly known as "John Brown." The tune itself is of southern origin, being ascribed to William Stefte, a composer of Sunday-school music. It was first heard in Charleston, South Carolina; then in various camp-meetings and among colored congregations until, in time, it made its way to the north. The original words were a hymn, beginning "Say, brothers, will you meet us?" "John Brown's Body" was an improvisation originating in the Twelfth Massachusetts Regiment, at the time it was at Fort Warren, in Boston Harbor. The singing of the song by the regiment as it crossed Boston Common and marched through the streets of New York caused it to become national property. Mrs. Howe's poem, "Mine Eyes have Seen the Glory of the Coming of the Lord," was the inspired result of an endeavor to set more fitting words to the music than those ordinarily sung at the camp-fires of the soldiers. The song has been more popular than any other of its kind and time, and is well known in the military circles of foreign nations. For the full story see *The History of American Music*, by Louis C. Elson. (Macmillan pub.)

Bauer (*bou'ĕr*), **Bruno,** a German philosophical and historical writer and biblical expositor of the Hegelian (rationalistic) school, was born at Eisenberg, Germany, Sept. 6, 1809, and died near Berlin, April 13, 1882. His writings embrace a number of critiques on the Gospels and Pauline Epistles; one on Strauss's *Life of Jesus;* an *Exposition of the Religion of the Old Testament;* besides a *History of the French Revolution to the Establishment of the Republic* and a *History of Germany during the French Revolution and the Rule of Napoleon.* He also published *Philo, Strauss, Renan and Primitive Christianity* and a work entitled *Disraeli's Romantic and Bismarck's Socialistic Imperialism.* On theological subjects, Bauer was a daring and destructive critic (the Voltaire of Germany he has been called); he denied the historical truth of the Gospels, and regarded the Christian religion "as overlaid and obscured by accretions foreign to it."

Baur (*bour*), **Ferdinand Christian,** an eminent German biblical critic and Protestant theologian, was born in 1792, and died at Tübingen, Dec. 2, 1860. A profound scholar and influential writer on biblical exegesis and Christian doctrine, Baur, in 1826, became professor in the evangelical faculty of Tübingen University, and labored there until his death. His writings, which deal chiefly with Christian dogma, embrace *The Christian Gnosis; The Doctrine of the Atonement; The Doctrine of the Trinity and the Incarnation, Critical Inquiries Concerning the Canonic Gospels, a History of Christian Doctrine to the End of the 18th Century; Paul the Apostle of Jesus Christ,* etc., etc.

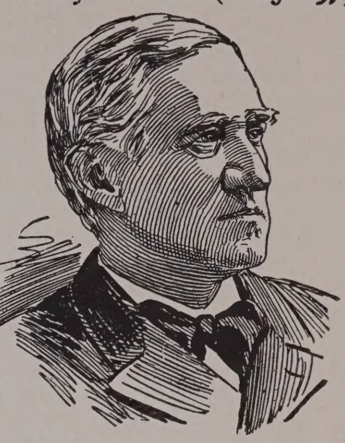
Bauxite (*boks'it*), a mineral ore, of a white, yellow, brown and red color, used with cryolite in the manufacture of aluminum, fire-brick, etc. It is found at Baux, France (whence its name) also in Austria, in the north of Ireland (chiefly in Antrim) and in North America, principally in Georgia, Alabama and Arkansas. In 1911 the production in the United States was 155,618 tons, the market value of which was $750,640.

Bavaria, a Socialist republic within the German Republic, second in size. It is divided into two parts, which are separated by Baden and Hesse-Darmstadt, the eastern division being fully eleven-twelfths of the whole. It covers 29,292 square miles, divided into eight districts, with a population of 6,876,497. The capital is Munich (population, 595,053). The southeast, northeast and northwest are walled in by high mountains, and the interior is cut up by small ranges and is well wooded. It is touched by the Rhine and Danube, and a canal connecting the two rivers passes through Bavaria, thus joining the Black Sea and the German Ocean. It is a farming country and the soil is very fertile. Large quantities of grain are grown, and the grape and hop for wine and beer are cultivated on a large scale, as more beer is manufactured here than in any other country in Europe. The Roman Catholics outnumber the Protestants about five to two. It has a fine system of education, under the direction of a minister of public instruction, with primary schools, high schools and three universities. The library at Munich is one of the largest in Germany. Before the World War the kingdom of Bavaria was a constitutional monarchy. In 1870 it became a part of the German empire. It retained many of its old privileges, such as the control of home affairs. The army is modeled after the Prussian system, and is under the command of the king of Bavaria in time of peace, but under the German emperor during war. The peace strength of the Bavarian army is 67,000 men. The Bavarians are the descendants of the ancient Boii, who were under the power of the Romans, and afterward formed a part of the empire of Charlemagne. The country was given to the Count of Wittelsbach in 1180, and has been under that house ever since. On the outbreak of the Franco-Prussian War, in 1870, Bavaria joined Prussia against France, and soon after became part of the new German empire. Prince Ludwig became king, as Ludwig III Nov. 5, 1913 following the deposition of the mad King Otto for whom he had ruled as regent for a number of years.

Baxter, Richard, a distinguished English preacher, was born in 1615. He had great influence as a chaplain in the Puritan army in the Civil War, which began in 1642, using all his eloquence to soften the stern political and religious views of the soldiers. His best known work is *The Saint's Everlasting Rest*. Other works are *Now or Never, Call to the Unconverted* and *The Reformed Pastor.* He died at London in 1691.

Bayard (*bī′ẽrd*), **James Asheton,** American statesman, was born at Philadelphia in 1767, and died at Wilmington, Del., in 1815. In 1796 he was elected to congress as a Federalist, and became noted as an orator, constitutional lawyer and leader of the house. In 1801 he was offered, but declined, the ministership to France. In 1804 he was elected senator from Delaware, and sat in the chamber until 1813, when he was chosen by President Madison, along with Albert Gallatin, to conclude peace with Great Britain, by the Treaty of Ghent. His son, of the same name, and father of Thomas Francis Bayard, born at Wilmington in 1799 and dying there June 13, 1880, was Democratic senator from Delaware during the years 1851–64 and 1867–69.

Bay′ard (*bä′ẽrd*), **Pierre Du Terrail, Chevalier De,** a famous French knight, was born near Grenoble in 1476. He served under Charles VIII in an expedition against Naples, and in the wars against the English and Spaniards he distinguished himself by his bravery and nobleness of character. In the reign of Francis I he gained a great victory for the king at Marignano, and defended the city of Mézières against Charles V, for which he was called the Savior of his Country. He was killed in a battle at the river Sesia, Italy, in 1524. He was so highly thought of for his virtues that his death was mourned by his enemies as well as by his friends. He is known as "the knight without fear and without reproach."



THOMAS FRANCIS BAYARD

Bayard, Thomas Francis, American statesman and secretary of state (1885–89), was born at Wilmington, Del., Oct. 29 1828, and died Sept. 28, 1898. His early manhood was spent in the practice of the law. In 1869 he succeeded his father as senator from Delaware, when he served continuously until 1885; then he entered Mr. Cleveland's cabinet as secretary of state. In 1880 and 1884 he was unsuccessful in obtaining the nomination, on the Democratic ticket, for the presidency. In 1893 he was appointed ambassador to England, the first to hold that rank as a representative of the United States.

Bay City, county seat of Bay County, Mich., noted for its beautiful streets and fine public buildings, is situated on Saginaw River, three miles from Saginaw Bay. The population, including West Bay City and Essexville (an important suburb), is now 54,000. It was first platted as the village of Portsmouth in 1836 and twenty years later as Lower Saginaw. Lumber and salt were formerly its main productions. Planing mills and lumber-yards are still in evidence, with wooden-ware works and box-factories coming to the front, while beet-sugar factories and coal mines now add to its prosperity. Lake transportation companies center here, and its shipyards should not fail to be mentioned. Large chemical works, industrial works for building heavy railroad wrecking cranes, bicycle works, foundries, etc., furnish employment to many. Bay City is a railroad center and a distributing point for a large section of country. It has 19 public schools, 287 teachers and an enrollment of 8,000; also a business college, a private kindergarten and seven parochial schools with an enrollment of 3,500.

Bay-de-Verde, an electoral district of Newfoundland. Population about 10,000; chiefly Methodists and Roman Catholics; occupations, fishermen and those engaged in the catching and curing of fish; chief towns; Bay-de-Verde, Cower, Island Cove, Grate's Cove, Old Perlican and Freshwater.

Bayeux (*bä′yẽ*) **Cathedral,** in the city of Bayeux, is said to be the oldest cathedral in Normandy. It was rebuilt by William the Conqueror, after a fire in 1077, but most of the present building dates from 1106 to the 13th century. On the west front are two steeples built in the 12th century and three beautiful sculptured porches. Here was kept for a long time the Bayeux tapestry.

Bayeux Tapestry, a roll of linen cloth about 230 feet long and twenty inches wide, on which is embroidered a panorama-like picture of the conquest of England by William the Conqueror. It is now preserved in the public library of Bayeux, Normandy, France. It is divided into seventy-two scenes, most of which have Latin inscriptions. The panorama begins with a picture of Harold taking leave of Edward the Confessor before setting out for Normandy, and ends with the battle of Hastings, the death of Harold and the flight of the English. It has usually been supposed that the tapestry was embroidered by Matilda, wife of William the Conqueror; but others believe it to have been worked for the Bayeux cathedral under the direction of Otho, bishop of Bayeux and a half-brother of William the Conqueror. It was discovered in the Bayeux cathedral in 1728, Lancelot having described an illuminated drawing of part of it in 1724. It is very valuable as a record of the customs and costumes of the period.

Bayonne (*bā-yōn'*), a city of Hudson County, New Jersey, is situated about seven miles southwest of New York on Newark and New York Bays. The Lehigh Valley and the Central Railroad of New Jersey enter the city. Bayonne is separated from Jersey City by the Morris Canal and from Staten Island by the Killvan-Kull. It has, moreover, excellent railway communications with New York City. The principal industries of the city are oil refineries, chemical works, and boiler and electrical works. The largest refinery works of the Standard Oil Company are situated here, connected by pipeline with the oil fields of Pennsylvania and Ohio as well as the principal cities along the Atlantic seaboard as far south as New Orleans. The American Radiator Company maintains its largest works here. Large coal docks add to the importance of this city. In 1930 the population was 88,979.

Bayreuth (*bī-roit'*), the capital of the province of Upper Franconia in northern Bavaria, is situated on the Red Main, about 125 miles north of Munich. The city is famous as the home of Wagner and Jean Paul Richter. One of Bayreuth's most interesting sites is the National Festival Theatre which was designed by Richard Wagner and opened in 1876 with a performance of his *Ring of the Nibelungen.* This theatre is devoted to music and attracts music lovers from all parts of the world. The Central Cemetery in the city contains the graves of Jean Paul Richter, Richard Wagner and Franz Liszt.

The principal manufactures of the town are cotton and woolen goods, leather, agricultural and musical instruments, and sewing machines. There are well-developed breweries, distilleries and brick kilns here. Bayreuth has excellent educational and charitable institutions. In 1925 the population was 35,306.

See Wagner, Richard.

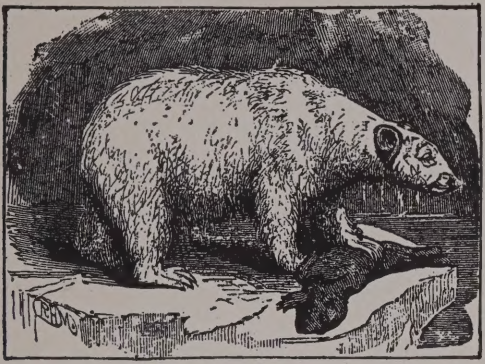
Bay Tree, a name given to a number of trees and shrubs resembling the laurel. The large-leaved evergreen, common in shrubberies, called the common or cherry laurel, is sometimes called bay laurel. The true bay leaves are used for flavoring. Bay rum, used by perfumers, is a liquid obtained by distilling rum in which bay leaves have been boiled. The leaves were also used to decorate houses at Christmas and at weddings.

Bazaine (*bä-zān'*), **François Achille,** a French general, was born at Versailles in 1811. He enlisted as a private in 1831 and served in Algiers, Morocco, in the Crimea and in Italy. In the French invasion of Mexico, he was Commander-in-Chief of the French army. He commanded the Third Army Corps in the Franco-Prussian War, and after the bloody battles of Mars-le-Tours and Gravelotte he was besieged in the city of Metz, where he surrendered on October 27, 1870, with 173,000 men, which included 6,000 officers. He was tried by courtmartial for treason and given the sentence of death, which was afterward mitigated to twenty years' imprisonment. He escaped, however, and fled to Madrid in 1874, where he died in 1888.

Beaconsfield, Lord. See Disraeli, Benjamin.

Bear, a large animal, omnivorous as to food, found in both warm and cold climates. The stout body, with thick legs and very short tail, is covered with long, shaggy fur; the whole sole of the foot rests upon the ground, and the claws are adapted for digging and climbing. Bears are found in Europe, Asia and America; those in cold climates being more fierce and less content with vegetable food than those in warmer regions. Bears generally are very fond of fruit, honey, nuts and roots, and when berries and green food are plentiful will often pass animal food untouched. The latter includes mice as well as elk and bison steak, and of ants they are very fond. Bears swim with ease, and some climb. In cold countries, at the beginning of winter, they hunt caves or hollows and sleep there until spring. The young bears are born during the winter, usually two in a litter, very small and helpless at first and almost hairless. Bears are very playful animals, have a great sense of humor, and generally are good-tempered and cheerful. Brown bears are plentiful in Europe and Asia. Comparatively recently new American bears have been described; one, the glacier bear living about Mt. St. Elias, and an enormous brown bear of Alaska which perhaps is the largest of living bears. Other varieties of bears live in Syria, the Himalayas, Russia, the Malayan region and the Andes Bears of North America are the polar bears of the far north; the big brown bears of Alaska; the grizzly bears, ranging from Mexico to Alaska; and the black bears, found generally in our forest regions.

The white or polar bears of the Arctic regions are very large, often measuring nine feet in length, and are very strong. They swim rapidly, and live largely on fish. They are more apt to attack man than any other variety. The males do not hibernate in the winter, but the females remain in sheltered places through the winter and bear their young. They are pure white all the year round. They swim rapidly, are the best swimmers of the bear family, can swim for hours in icy water, and are excellent divers.



POLAR BEAR

The Kadiak bear or the great brown bear sometimes grows as large as an ox. It belongs to Alaska and adjacent islands. In the spring it wears a coat of beautiful golden yellow, which later turns to brown. This enormous bear has markedly high shoulders and a massive head. The glacier bear belongs to the glacier region of Mt. St. Elias. Little is known of it. It is reputed shy and fierce, its general color bluish-gray.

The grizzly is the most ferocious of bears, a great, lumbering, fierce fellow. Before the day of the long-range rifle he was very hard to kill, a great fighter, but now his numbers are much decreased. He is peculiar to North America, and is found mainly in the Rocky Mountains. The fur is dull brown, around the head somewhat gray. The claws are long and curved. Its strength is equal to dragging a bison, and in the days when "buffalo" was plentiful on the plains it was a persistent hunter of this animal. It now preys on horses and cattle, but wanting these must manage with such minute game as mice. It greedily eats berries, wild plums, green fodder, almost everything it can chew. The adult grizzly cannot climb trees, but when he has found a good hunting range he will reach up as high as he can on the trunk of a pine and there make a mark that means "Keep Off"—a challenge well understood by animals passing that way.

The American black bear is thought by many to be a variety of the brown bear. In our forest regions both east and west, north and south, it is found, still quite common in lonely mountains and in timbered land. It is all inky black save for a brownish tinge or dirty white on the face, and some, called cinnamon bears, are dark chestnut in color. It is naturally timid and inoffensive, and stands in terror of man, but will fight savagely if attacked or called on to defend its cubs. Except in the spring it lives chiefly on vegetable food. It is excessively fond of blueberries, also of honey, and will endure many stings from the bees to get possession of the sweet it craves. After the long winter's fast it eats snakes, bugs, fish, anything it can get; when eager for animal food, it will kill cows, sheep, and steal from the pig-pen; in the fall, nuts, acorns, wild grapes and mushrooms vary its fare. The black bear usually carries its head low, and is highest in the middle of its back. It climbs with ease and runs swiftly. The young cubs are very playful and good tempered, but grow to be much too rough for close association. See Hornaday: *American Natural History;* Stone and Cram: *American Animals.*

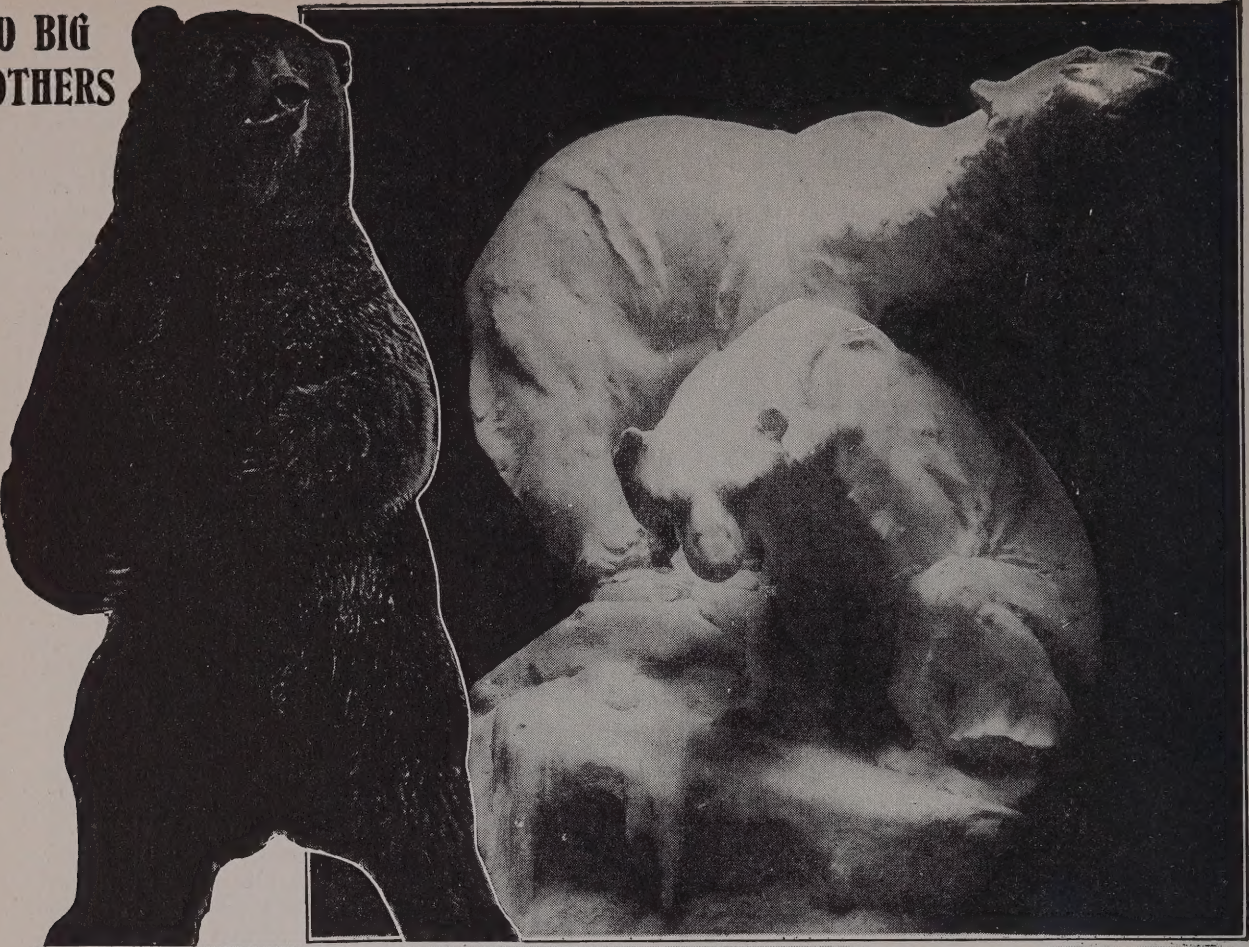
Bear, Greater and Lesser, two groups of stars or constellations in the northern sky. In the Great Bear are seven very bright stars, forming the "dipper." The body of the "dipper" is made by four stars forming a quadrangle, the other three, which make the handle, being nearly in a straight line. The straight line which passes through the two stars on the side opposite the handle, passes also very nearly through the pole star; distant about five times the length between the two stars. These two stars are therefore called the pointers. In the Lesser Bear a group of stars also forms a dipper, but the stars are not nearly so bright.

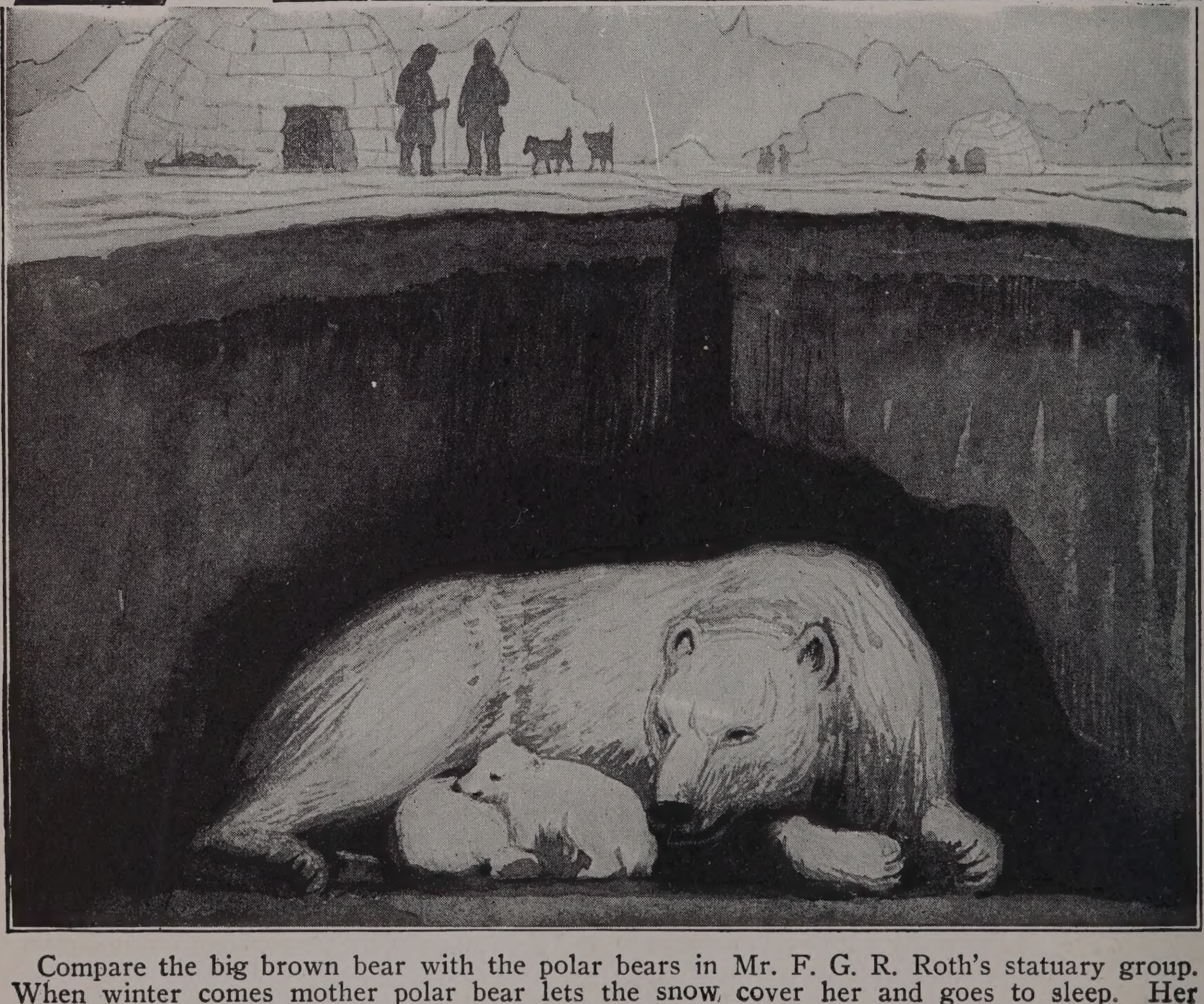
The end of the Little Bear's tail is the Pole Star, which lies almost exactly over the north pole. The Great Dipper is easily recognized by the star-gazer, and remembering the pointers, then locate the Pole Star, and the Little Dipper may readily be found. In most star-maps these constellations are called by their Latin names, *Ursa Major* and *Ursa Minor.* See Ball: *Starland,* also *The Story of the Heavens;* Moulton: *Introduction to Astronomy.*

Beard, William Holbrook, an American portrait and animal painter, was born at Painesville, Ohio, April 13, 1825, and died February 20, 1900. After studying art in Europe, he settled in New York, where he was very successful in painting pictures of animals. He had quite a gift for depicting with humor animal life, and for giving human expression to the faces of his animal subjects. Some of his best known pictures are *Kittens and Guinea Pig, Bears on a Bender, Voices of the Night, Who's Afraid, Raining Cats and Dogs,* etc. A collection of his sketches appeared in 1885, with the title: *Humor in Animals.*

Be'atrice, Neb., a city, the chief town of Gage County, in Nebraska on Big Blue River, 40 miles south of Lincoln and 90 miles southwest of Omaha. It is reached by the Union Pacific, Rock Island, Burlington and Missouri River and other railroads,

TWO BIG BROTHERS





Compare the big brown bear with the polar bears in Mr. F. G. R. Roth's statuary group. When winter comes mother polar bear lets the snow cover her and goes to sleep. Her breath opens a passage into the outer air. Toward spring her babies are born.

which give facilities to its growing trade in flour, lumber, agricultural implements and cement and stone from important quarries in the vicinity. The city is well laid out and possesses many fine buildings, including court house, municipal buildings, banks, churches, schools and public library, besides a state Institute for the Feeble-Minded. The city owns and operates its own water-works, while it derives from the river good water-power for its industries. Settled in 1859, Beatrice became a city in 1873. Population, 9,356.

Beauharnais (*bō'är'nä'*), **Eugène de,** a French soldier and statesman, was born at Paris in 1781. His mother (Josephine) became the wife of Napoleon Bonaparte. He held many positions in the French army, and in 1805 was appointed viceroy of Italy, filling the position with ability. He showed courage and military capacity in the campaigns against Austria and Russia. He conducted the retreat from Russia in a masterly manner. After the overthrow of Napoleon, he lived at Munich, the title of Duke of Leuchtenberg being granted him by the king of Bavaria, whose daughter he had married. He died there in 1824.

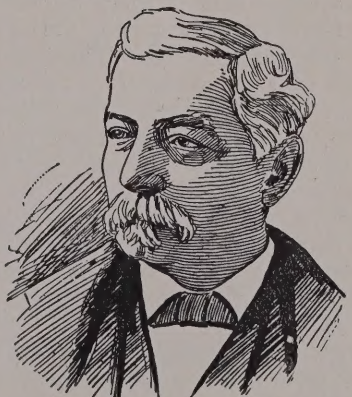
Beaumarchais (*bō'mär-shä'*), **Pierre Augustin Caron de,** a celebrated French dramatist, was born at Paris in 1732. He became so skilled as a musician that he was appointed to teach the daughters of King Louis XV to play on the harp. He wrote, as a defense of himself against a charge of fraud and forgery, his well-known *Memoirs*, which is a masterpiece of French writing and gave him quite a reputation. During the American Revolution, he supplied the American army with a large quantity of arms and ammunition, for which he received the warm thanks of Congress, but not the money payment which was promised. One fourth of the debt was paid thirty-six years after Beaumarchais was dead. He was a supporter of the French Revolution, and was obliged to leave France for a time. His greatest drama is *The Marriage of Figaro*. *The Barber of Seville* was also very successful. He died at Paris in 1799.

Beaumont, Texas, a city, the seat of Jefferson County, situated at the head of tidewater navigation on the Neches River on which it does a large trade in the shipment of yellow pine and cypress lumber and shingles via Sabine Pass. It is reached by a number of railroads, including the Santa Fe, Southern Pacific, Frisco & Kansas City Southern, operating eleven lines in all. It lies 83 miles northeast of Houston. Its industries connected with the lumber, oil, foundry and machine shop trades are expanding rapidly and this of recent years has given an impetus to the developing of the city. Population, 46,000.

Beaumont (*bō'mŏnt*), **Francis,** an English dramatist, was born in 1586. He was educated at Oxford University, and afterward studied law, but neglected it for literary work. He became a great friend of the dramatist, John Fletcher, and nearly everything he wrote was in partnership with him. He was also acquainted with Ben Jonson and other writers of the time. The finest of the dramas which the two friends, Beaumont and Fletcher, wrote together are *The Maid's Tragedy* and *Philaster*. *The Coxcomb* and *Cupid's Revenge* are also well known. Beaumont was one of the most gifted writers of the age of Elizabeth. He died in 1616.

Beaumont, William, an American surgeon (1785–1853). While he was in the United States army he had to care for a man who had been shot in the left side. The patient got well, but the wound in the side healed without closing up, leaving a large hole through which Dr. Beaumont was able to watch the process of digestion in the stomach. He thus found out and described the action of gastric juice in digestion, the process not being definitely known before. His observations and experiments were of great importance.

Beauregard (*bō're-gärd'*), **Pierre Gustave Toutant,** an American general, born in 1818 near New Orleans. He graduated at West Point in 1838, and won considerable distinction in the Mexican War. He was stationed until 1860 at New Orleans, in charge of engineering works on the Mississippi and the Gulf, and also had the oversight of the building of the mint. He resigned his position as superintendent of the Military Academy at West Point to become a brigadier-general in the Confederate army in 1861. He directed the attack on Fort Sumter, and defeated General McDowell at Bull Run. In the spring of 1862 he was second in command of the Department of Tennessee. At the battle of Shiloh, after the death of General Johnston, Beauregard became commander, and in the first day's fight partially defeated General Grant; but General Buell having reinforced Grant during the night, Beauregard was defeated. He fell back on Corinth, which he fortified and held until May 30, when he made a masterly retreat to Tupelo. Owing to failing, health, he was for a time relieved from active service, but later took command of the defense of the southern coast. While stationed at Charleston, he defeated the attack

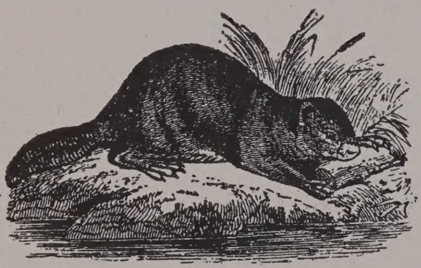


GENERAL BEAUREGARD

of General Gillmore and Admiral Dahlgren in 1863. In 1864 he successfully resisted General Butler, and held Petersburg against Grant's attack until the arrival of General Lee. He later had the task of resisting General Sherman's march to the sea. After the war he became president of the New Orleans and Mississippi Railroad, and in 1878 was made general manager of the Louisiana Lottery Company. He died near New Orleans, February 20, 1893.

Beaux, Miss Cecilia, American artist, born in Philadelphia, Pa. She studied art in Paris, and has been four times awarded the Mary Smith Prize of the Pennsylvania Academy of Fine Arts. Her paintings have been honored in both Europe and America, and she has received many medals and awards. She is represented in all the important galleries of the United States.

Beaver, a gnawing animal of very interesting habits, related to squirrels, but living in the water. Beavers live in Europe, Asia and North America, although there is believed to be only one kind. They are about two feet long, one foot high, and weigh from forty-five to sixty pounds. The beaver is, therefore, one of the largest and heaviest of the gnawers. It has a very unusual tail, oval, flat and scaly, about ten inches long and three inches wide. The rest of the body is covered by fur of two kinds: a soft, thick, gray under-fur, overlaid with polished and glistening chestnut-brown hairs. The fur is one of the most valuable furs of commerce.



BEAVER

The beaver feeds mainly on bark of trees (willow, poplar, birch, etc.), roots, buds and leaves. It gnaws down trees not only for constructing dams and houses, but to get the finer branches and twigs for food. The front teeth are remarkably large, and of deep orange color on the outside. They are like the front teeth of the squirrels, rabbits and other gnawing animals, hard in front and softer behind, so that by use they get worn to chisel edges. With these teeth they gnaw through trees as large as nine feet in circumference. Their hind feet are webbed and the flattened tail serves as a sculling oar and rudder, which makes them splendid swimmers and divers. They can remain two minutes under water. They are social animals; a family of several members usually live in one house; and sometimes a large number of families collect together in a community. Usually there are four young ones at a birth. The young beavers leave home in their third summer and set up new households, and when communities become too large for comfortable living, an emigration takes place. Once in a while a solitary old bachelor is found, a recluse living alone in his burrow.

Their habits are remarkable; they usually work at night, and so diligently, that "working like a beaver" has become a common saying. They build houses, lodges and dams in forest brook, well-concealed from haunts of man. The simplest form of house is merely a burrow opening under water. The lodges are more elaborate and are of three kinds: the island-lodge, built on a small island in a pond; the lodge built on the banks of streams and ponds; and the lake-lodge on the sloping shores of lakes, with a considerable portion of the hut out of water. A description of one of the island-lodges will be sufficient: It is an oven-shaped house of sticks, grass and moss woven together and plastered with mud, so strong as to protect the inhabitants from beasts of prey. The room inside may measure eight feet in diameter and two or three feet in height, and the floor is carpeted with bark, grass and wood chips. There are two entrances, both underneath; one is straight, through which the wood for winter food is passed; the other, called the beaver entrance, is often winding in its course. Both these entrances open into a moat around the house, too deep to freeze easily, so that the beavers are not likely to be shut in. When the trees near the water are used up and the land is too uneven for rolling, log-slides or canals are cut in the bank to carry down the timbers. These may be hundreds of feet long and about a yard in width and depth.

So they may easily pass back and forth under the winter's ice, and that they may have room to store food, dams are built to increase the water about the lodges. They are often of great size—one is reported as being 1,530 feet long. The first step in dam-building is selection of a suitable site, a narrow place with firm bottom. Then work is begun on felling trees. They commence by gnawing deep parallel grooves about the trunk, in chips pull out the wood between the grooves; repeating this until nothing is left but a few last fibres, the trunk is ready to fall. Some say they always plan for the tree to fall toward the water, others declare they work haphazard. After the tree is down the beavers set to work lopping off branches and cutting it in lengths they can drag into the water. The short logs, dragged or floated to the desired spot, are sunk lengthwise across the current and kept down by means of stones, sod and mud loaded on by the beavers. To provide for winter needs, they collect a goodly supply of birch, willow and poplar.

which they stack near their homes, sinking the ends well in the mud so the gathered store cannot float away.

During the 17th and 18th centuries beaver skins held first place in the world's fur trade. For many years the beaver was called upon to furnish hats for men of fashion. So great was the demand for the fur that in the western part of Canada and the United States beaver-skins passed as currency. Where once they were almost unbelievably plentiful, their numbers now are fast decreasing. Rigid protection in eastern Canada is reported, and a plea has been presented for a game and fur preserve in the Canadian northwest. See Morgan: *The American Beaver and His Work; McClure's Magazine*, April, 1901; *Scientific American, Supplement*, August 13, 1904; *Plea for Establishment of Game and Fur Preserve*, Report of 8th International Geographical Congress.

Beaver Falls, Pa., a city of Beaver County, thirty miles northwest of Pittsburg, located on the Beaver River near its junction with the Ohio. It has excellent water power and in addition there is an abundant supply of coal and natural gas; hence it is an important manufacturing point, the principal products being fence wire, nails, shovels, files, saws and other articles manufactured from the finer grades of steel. Pottery is produced to some extent and also glassware. Here is located Geneva College, an institution affiliated with the Reformed Presbyterian denomination, having in attendance a large body of students. Population, 14,000.

Bebel (*bā′bĕl*), **Ferdinand August,** an able and influential leader of the German Socialists in the Reichstag, of which he served as member for over thirty years. Born at Cologne in 1840, he early in life became a turner by trade, and as early identified himself with workingmen's labor organizations, out of which he built up a progressive social-democratic party having a compact vote of three millions. Few Germans of his time engaged in public affairs made a more notable name than he, as his influence in labor-congresses bore witness, not to speak of the sympathy felt for him by large masses of followers, owing to his repeated imprisonments on a charge of high treason and of *lese-majesté* against the German Emperor. Herr Bebel was a powerful and convincing speaker, an extensive contributor to socialistic journals and a writer of books, among them a life of the French socialist Fourier, and *Die Frau und Der Socialismus*. He died in 1913.

Bechuanaland (*bĕchŏŏ-ä′nȧ* or *bĕk′ū-ă′na-lănd*), is a native territory in South Africa annexed to Cape Colony in 1895. It contains 51,524 square miles and a population (estimated for 1908) of 94,608, of whom 9,608 were whites. It is traversed by the Cape-to-Cairo Railroad.

Bechuanaland Protectorate, The, has an area of about 275,000 square miles, about that of British Columbia, and a population (1905) of 137,832, only 1,000 being whites. It is bounded west and north by German Southwest Africa, north by Zambezi River and British Central Africa, east by Matabeleland and Transvaal and south by British Bechuanaland and Molopo River. The chief tribes are the Bamangwato, Bakwena and Bangwaketse. These and the others are governed by a resident British agent responsible to the High Commissioner of South Africa, but Khama and two other chiefs rule their peoples in subordination to the resident. No licenses for the sale of spirits are granted. Herding and farming are the chief industries. Much of the land is held by native chiefs, who also collect the hut-tax, but the people are peaceful and contented. The Cape-to-Cairo Railway passes through the protectorate, and the telegraph connects it with Cape Town, Portuguese East Africa, Rhodesia, Ujiji and the whole world. In 1905–6 the income was almost $143,265; the expenditure about $373,915; and the grant-in-aid for 1906–7, $220,000.

Beck′et, Thomas à, an English archbishop, born in London about 1118; murdered in Canterbury cathedral, Dec. 29, 1170. His father, a London merchant, was a friend of Theobald, archbishop of Canterbury, who thus became acquainted with the young man, helped him in his education, and induced him to enter the church, also bringing him to the notice of King Henry II, who soon after appointed him lord chancellor of England. Becket showed great ability, and also distinguished himself in Henry's war against France. He lived in great magnificence and was constantly in the company of the king. In 1162, on the death of Archbishop Theobald, the king had Becket appointed archbishop of Canterbury. Immediately Becket's conduct changed. Instead of the brilliant courtier and statesman, he became grave and austere, and began to oppose the king, making himself the champion of the rights of the church against the king's demands. In 1164, at Clarendon, the king had resolutions drawn up which declared what the king's rights and what those of the church were on certain disputed points. These Constitutions of Clarendon, as they were called, Becket at first refused to agree to, but finally signed them. As soon as he left the place, he repented having signed them and declared that they ought not to be observed. He was then obliged to flee to France. In 1170 he was allowed to come back; but he at once began his old opposition to the king, who was then in Normandy. The king is said to have angrily cried out: "Will no one rid me of this pestilent priest?" At once four knights left the king, and, going to Canterbury, murdered Becket at the altar of the church. He was declared a saint by the pope, and his tomb at Canterbury became a shrine visited by pilgrims from all over the world. But the beautiful shrine was destroyed by Henry VIII, and the cathedral was partly destroyed by fire in 1872.

Becquerel (*bĕk'rĕl'*) **Rays.** About one year after Röntgen made his beautiful discovery that X-rays could be produced by the use of an induction coil and a vacuum tube, a French physicist, M. Henri Becquerel, found that the metal *uranium* and its compounds are continually emitting rays which possess almost exactly the same properties as X-rays. This new radiation which is emitted spontaneously by uranium has received the name Becquerel rays. Experiments have shown that these rays possess the following properties:

1. They are propagated in straight lines, as is ordinary light.
2. They affect the photographic plate, as does ordinary light, though in a much less degree.
3. They traverse thin plates of opaque bodies, unlike ordinary light.
4. They are *not* reflected, refracted or polarized, as is ordinary light.
5. They render the air through which they pass a conductor of electricity, or, as the chemist says, they ionize air.

A full account of this discovery is to be found in Becquerel's papers, which are published in the *Comptes Rendus* for the first few months of 1896.

Bede or **Beda,** surnamed The Venerable, an English monk, scholar and church historian, was born in 673, in what now is the county of Durham, and died at Jarrow, at the monastery of St. Paul, in 735. He is said to have been the most learned Englishman of his day, and in the seclusion of his cell he wrote, besides his important *Ecclesiastical History of England,* which was translated from the Latin by King Alfred into Anglo-Saxon, a number of commentaries, homilies, hymns and lives of the saints.

Bedford, Indiana, is the county seat of Lawrence County, on the Baltimore and Ohio Southwestern, Chicago, Indianapolis & Louisville and Terre Haute & Southeastern railways, 75 miles northwest of Louisville. It has valuable quarries near by, chiefly of a fine, durable oolitic limestone, much in request for building purposes. Its other industries include veneering mills and lumber factories, besides railway shops, etc. It is the seat of Bedford Business University and public schools that employ sixty teachers. Population 11,000.

Bed'ford, Admiral Sir Frederick George Denham, G.C.B., K.C.B., C.B., has been governor of Western Australia since 1903. He was born in 1838, the son of Vice-Admiral Bedford, and entered the royal navy in 1852. His service has been interesting and extensive. He was present at the bombardments of Odessa, Sevastopool and Sveaburg, commanded the Shah in its engagement with the Huascar, organized the Nile flotilla in 1884, commanded the expeditions against Fodi Silah in Gambia in 1894, against Nana of Brokenin on the Benin the same year and against King Koko of Nimbi on the Niger the year following. He was one of the lords of the admiralty from 1889 to 1892 and from 1895 to 1899, taking command of the North American and West Indies station in the last named year and retaining it until he received his present appointment.

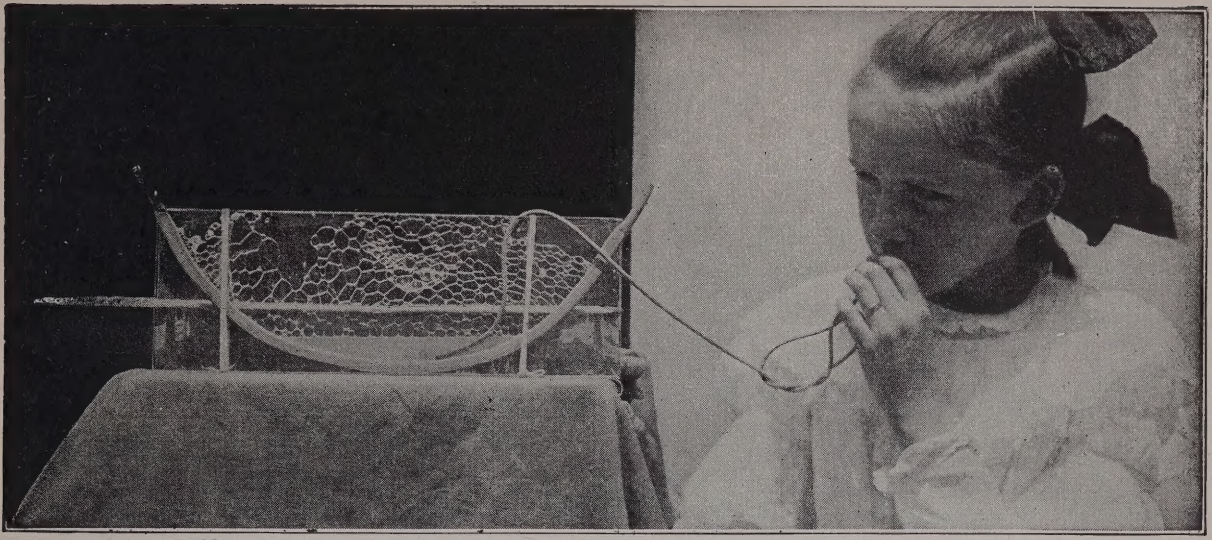
Bedford, Duke of. See JOAN OF ARC.

Bedloe's Island, in New York harbor. In 1800 it was ceded to the United States government, and in 1841 Fort Wood was built on it. Within the fort now stands Bartholdi's great statue of *Liberty Enlightening the World,* presented by France to the United States.

Bedouins (*bĕd'ōō-ĭnz*), meaning "dwellers in the desert," are Arabs who lead a wandering life. While the desert of Arabia is their central place of abode, they have spread themselves over many countries, and are now to be found from the western boundary of Persia to the Atlantic and from the mountains of Kurdistan to the negro countries of Sudan. In a few regions they have mixed with other nations; but as a rule they have kept their separate character and independence. They now form a seventh of the population of Arabia. They have seldom acted as a united people in the world's politics. They are herdsmen and generally robbers, and recognize little law except tribal custom. One or more families form the core of a tribe, a kind of aristocracy, and from their number a superior sheikh is chosen to lead them and to judge between those engaged in disputes, if they choose to come to him. They manufacture their own woolen clothes, and their food is mainly obtained from their herds, though they also eat rice, honey, locusts and even lizards. Certain tribes, however, live in houses and practice agriculture.

Bee, an insect related to wasps and ants. Bees abound in all parts of the world, numbering about 5,000 species. All when adult feed on sweet juices. There are the solitary bees, each female providing a nest for her young, as the carpenter bee and others; the social bees, so called because many work together to build a common home; guest bees, that lay eggs in the nests of others. The carpenter bees bore tunnels in dead tree trunks, fence posts, even in the joists of buildings. The burrow runs across the grain at first, then at right angles to this a deep burrow is made, and other galleries may be added. These bees are indefati-

HOW HONEY COMB CELLS ARE MADE



Courtesy Technical World.

This picture of the little girl blowing soap bubbles illustrates the latest answer of science to one of Nature's oldest conundrums:

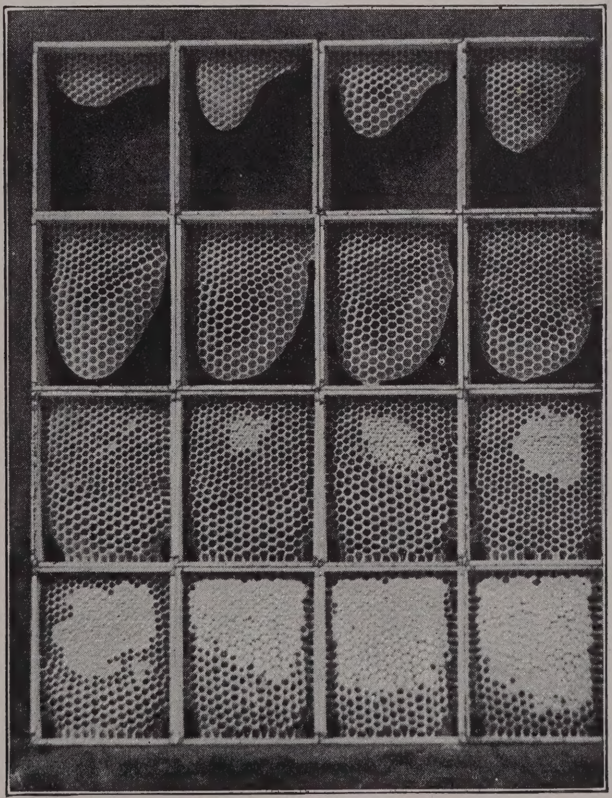
"Why are the cells of the honey comb six sided?" Look at the bubbles and see if you can't find this answer before I tell you.

Ever since King Mykennos of Egypt made his royal sign in sealing wax with the image of the bee in his ring—and long, long before that—men have kept and studied bees and spoken of their wonderful instinct in making their cells six-sided. Round cells waste space; six-sided cells make use of all the space and make the comb stronger because the cells support each other better.

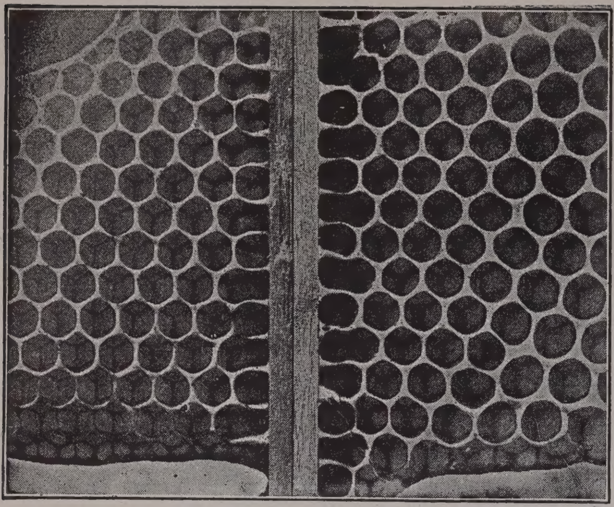
Now it is pointed out that the bees make the cells round in the first place; as you can see in the next picture they grow six-sided as the frames fill. So it is the pressure of the cells against each other that makes them six-sided, just as the pressure of the soap bubbles is changing them from round to six-sided figures. The soap bubbles do not take an equal sided shape because they are not strong enough and last too short a time.

A comb of 4000 cells is made in twenty-four hours. (How many cells an hour?)

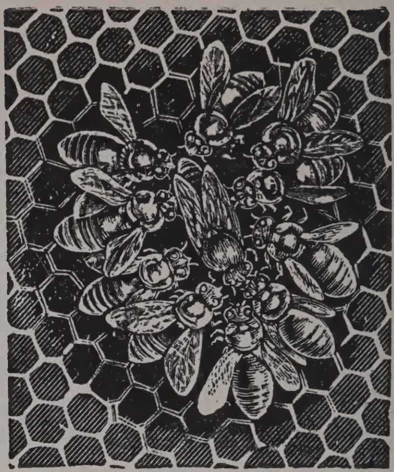
After the breeding season the cells are built out longer and turned up at the end to keep the honey from spilling out until the cells are filled.



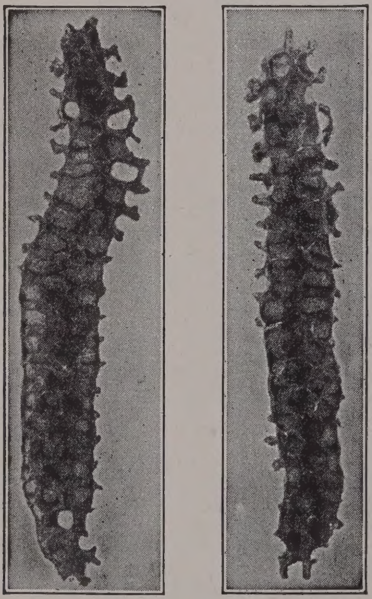
This picture shows the frames which are used in artificial hives. The bees begin to build the comb from the top of each section. When filled with honey, the bees seal the cells with wax. The frames are easily lifted from the hive at the convenience of the bee-keeper.



This picture shows how these cells will look under the microscope; and it shows something else. Notice that the point of meeting of the three sides of three cells is just opposite the center of the cell in the other side. Any carpenter, architect, mechanical engineer or your big brother in High School will tell you that this greatly increases the strength of the comb. You can see this back to back arrangement of a comb if you will hold one up to the light.

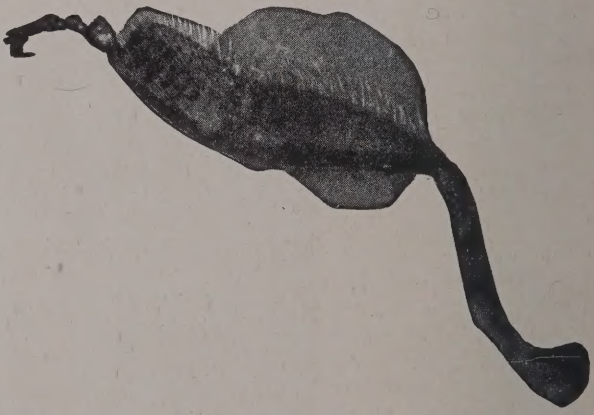


The queen bee reigns in the hive, and is treated with reverent courtesy and attention. When she moves about she is attended by a body guard, as seen in the picture. They form a circle about her with all their heads towards her. They walk backwards before her, and when they retire they move backwards, still facing their queen. They feed her with honey and bee-bread.

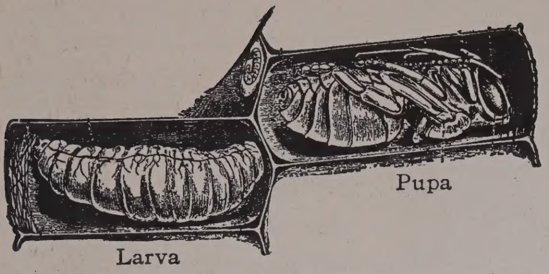


This picture shows that combs are not made only to hold honey, but to brace the little bee city—for that is just what a honeycomb is—so that it can't fall or be shaken down; as cities built by men sometimes are when they are shaken by earthquakes or struck by whirling winds.

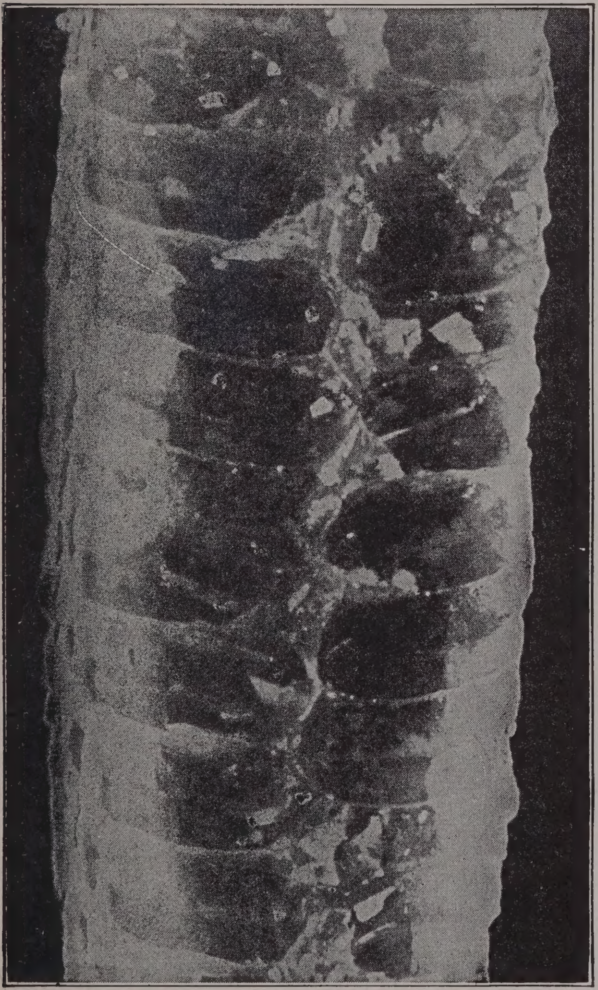
If you ever find a beehive in the hollow of a tree, you will find these braces protecting it against the swaying of the trees in the wind. You will not find them in artificial hives.



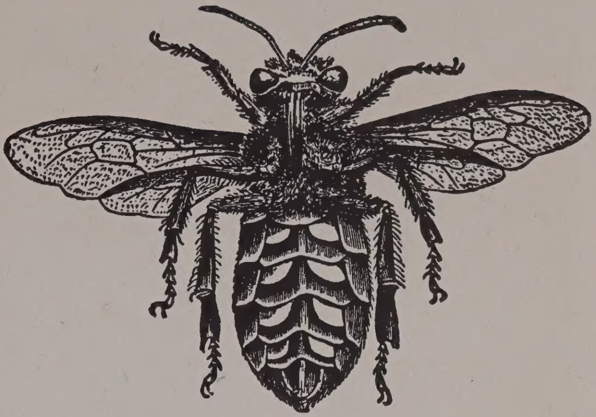
When the workers go out into the fields for pollen to feed the babies, they carry along "market baskets." These baskets, as you see in this picture, are on the outside of each pair of hind legs. Both body and legs are covered with hairs which collect the pollen. The bees scrape the pollen off one leg with the other and put it into the basket. You have noticed the flies have the same habit. Bees do most of their collecting within two miles of the hive. The pollen is first rolled into a ball before it is dropped into the basket. The baskets are arched over with hairs to protect these little balls from falling out. Sometimes the bees roll in the flower so as to get themselves all covered with pollen—just as you have seen horses roll, or a bird flutter dust over himself.



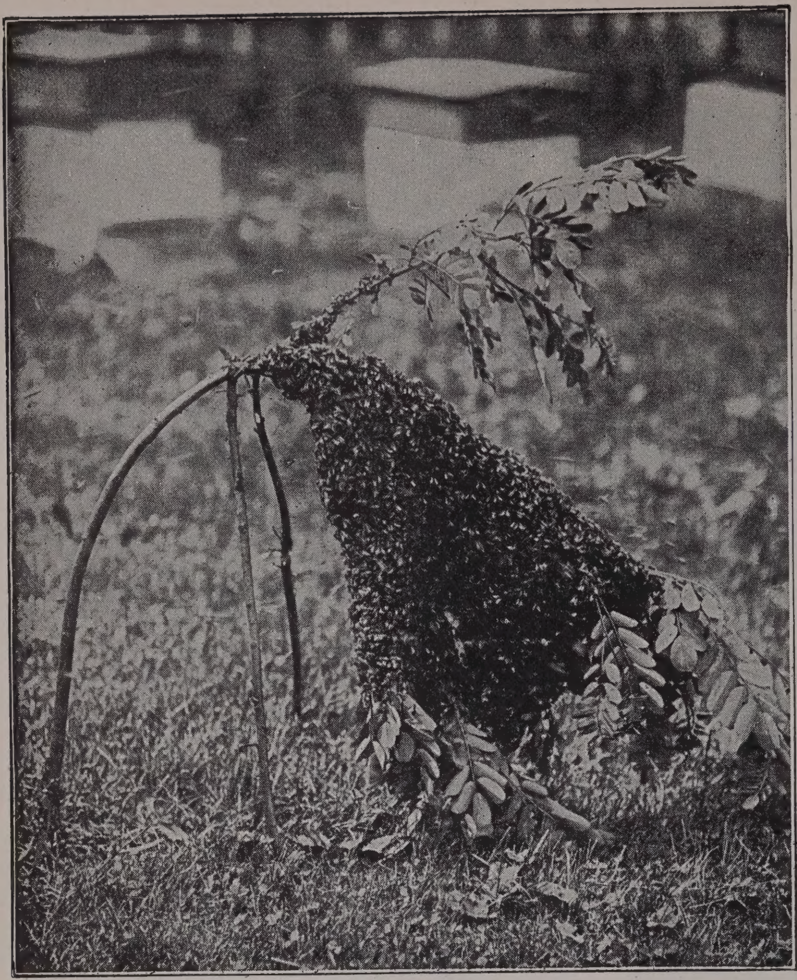
Bees' eggs are long shaped, about one-twelfth of an inch in length, are bluish white, and hatch in three days. The eggs hatch into little worm-like creatures, called larvae. They lie curled up in their cells as you curl up in bed on a cold night. They are fed by the workers for five days and then they refuse to eat and the workers seal up the cell—very much as you pull the bed clothes over your head and go to sleep. Then the bee that is to be spins himself a silk cocoon and is changed into a pupa—such as you see in this picture. About the first day after he becomes a pupa, he breaks from his cell a perfect little bee. All his aunts caress him and feed him just as other people do their babies. The next day, he tries his wings.



This picture gives an end view of a comb and shows how the honey is kept from spilling out before the cell is filled and sealed up; just as Mother seals her jelly glasses when they are ready for the winter storehouse. See how the bottoms of the cells are curved.

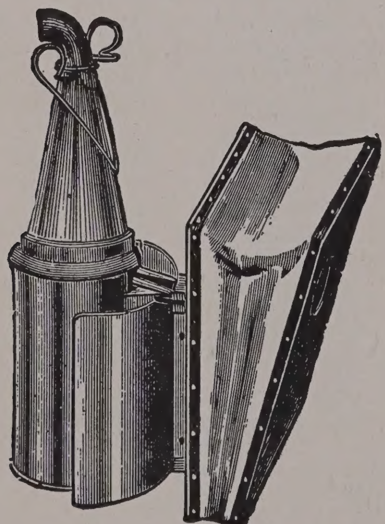


We see here the under side of the worker bee. This is magnified three times so as to show clearly the wax scales or pockets. When a swarm of bees begin to keep house in a new hive their first task is to manufacture wax out of which to make the comb. It is interesting to note what bees do and how they conduct themselves in making the wax. They eat all the honey they possibly can and then they remain quiet for about twenty-four hours. We do not know how the honey is changed into wax, but at the end of that time the wax appears in these wax pockets that you see in the picture. In the new hive the bees have suspended themselves from the top or roof of the hive and hang down like a curtain. When the scales have become filled with wax, they are ready for work and some of them run up to the top of the hive and lay the foundation of the comb. The making of the comb then proceeds rapidly. It takes about twenty-one pounds of honey to make one pound of wax, but this amount will make about 35,000 honeycomb cells. When first made the wax is of a white color; it turns brown with age.

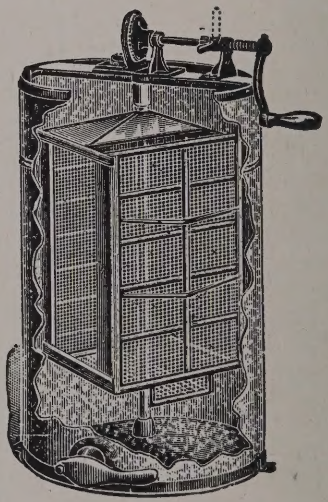


SWARMING

When so many bees are born that the hive becomes crowded, the inmates seem to come to an agreement to divide themselves up into two parties, one remaining in the old hive and the other starting out to secure a new home. This is called swarming. The new swarm must take the old queen with them. The queen is usually among the last to leave the hive. Sometimes she does not go at all and then the swarm returns to the hive after a time and try it again the next day The first swarms usually come out in June and sometimes a second, or even a third, swarm issues during the season. Usually after going a short distance the swarm alights on a bush or the limb of a tree, and here the bee keeper follows and the swarm is skillfully transferred to a hive. In the picture we see a large swarm which settled on a slender tree, bending it over by its weight.

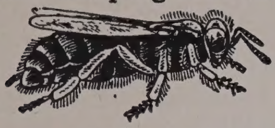


A SMOKER. This picture shows the tool which is used by men in getting the honey from the hive. We cannot drive bees from the hive, as we can drive cattle and horses with a whip. If you were to try it you would soon be driven off yourself by the angry bees, with their terrible sting. It is here that the power of smoke comes in. Blow a few puffs of smoke into a hive and it is astonishing to see the bees turn about and retreat in perfect dismay and fright. The above cut shows a picture of a device which is used for this purpose. In the can there is a little fire made with rotten wood or other material. The bellows forces the smoke through the mouth of the smoker into the hive. The bees soon become quiet and stupid and the comb can be handled without trouble.



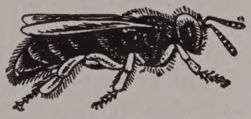
A HONEY EXTRACTOR. The above is the picture of a honey extractor The original honey extractor was invented by a major in the German army who saw his little boy swinging an unsealed comb in a basket on the end of a string. He swung it around his head and his father noticed that the honey oozed out. Then he made a machine such as you see in the picture which, when whirled very fast, forced the honey out of the comb, just as the cream separator separates the milk from the cream. After it is forced from the comb the honey drops to the bottom of the machine.

gable workers and very hard to discourage. Carpenter bee, digger bee, potter bee, cuckoo bee, honey bee, bumblebee—all are of much interest and well-worth close study.

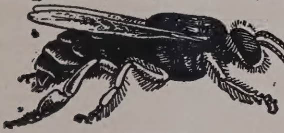


QUEEN BEE

The social bees, including the bumblebee and honey bee, are the best known. The latter was originally introduced from Europe into America, more than three centuries ago, and escaping swarms stocked the forests with what are now called wild bees. There are three kinds of individuals: the queens, the workers or undeveloped females and the drones or males. The queens and workers have stings connected with poison sacs, but the drones have no stings. Each kind is produced in a particular kind of cell. That in which the queen is reared is especially large. The undeveloped queens are provided with a kind of food called royal jelly. The cell of the drone is larger than that in which the worker is reared. It is possible, however, for the active workers to enlarge a cell that would ordinarily produce a worker, and by changing the food to royal jelly cause the young grub to develop into a queen. When several queens mature at the same time there is a royal battle among the rivals and the one who succeeds in stinging the other to death is left as reigning sovereign. The queens lay eggs in large numbers, placing in different cells those that are intended for workers, drones and new queens.



WORKER



DRONE

The drones are males and are destroyed by the workers soon after the honey season. The workers do all the work of the hive. They gather the honey, bee-glue and pollen, which is made into bee-bread with which the young are fed. They clean the hive, form the wax, build the comb and care for the young. The formation of wax is very interesting. Some of the workers gorge themselves with honey and remain quiet for about twenty-four hours, after which the wax comes out as little plates from the wax pockets on the under surface of the body. About twenty-one pounds of honey are consumed to manufacture one pound of wax, but this amount will make about 35,000 honey-comb cells. The cells are six-sided; in building the same the workers begin at the top and build downwards, leaving some spaces for passage ways. Some of the cells are for honey, others for eggs.

The migration or swarming of the bees usually happens when the hive becomes too crowded. The first swarm, led by the old queen, usually starts out in June, leaving the new queen in possession of the hive. A second and third swarming sometimes take place. The swarm comes out, numbering thousands, and soon lights, usually on the limb of a tree, hanging like a bag, from which it may be taken and put into a hive.

"A swarm of bees in May
Is worth a load of hay.
A swarm of bees in June
Is worth a silver spoon.
But a swarm in July
Is not worth a fly."

Before swarming takes place there is no little commotion in the hive. The queen (or, better, mother) of a hive is an indispensable member, and beautifully cared for by the others. But between queen and queen there is little friendliness, and when a new queen comes forth from her cell the old queen knows her day is over, she must leave and go off to establish a new home. Warning of the flitting is given by both new queen and old. At the sound of the piping of the former a thrill passes through the hive, the queen giving special sign of agitation. Swarming takes place on a fine day, and may be considerably retarded by cloudy weather. Some of the new hives may be opened, an observer having opportunity to study the condition of the swarm and the progress of the work. Keepers often use little machines that puff smoke into the hives, this making the bees quiet without hurting them, and allowing the keeper to handle them. Bees become quite tame when handled often.

The sting is at the extreme end of the abdomen. The poison, pumped from the poison-sac with great rapidity, exudes from the many infinitesimal barbs of the dagger-like sting. The angry bee, leaving her sting behind in her victim, falls a victim, too, and shortly dies. A person stung should immediately remove the sting, which retains poison. The bee's tongue is a delicate and complicated instrument, which, when not in use, is folded back beneath its head; when active, working with lightning flash. For especially deep, tubular flowers there is an extra length of tongue that can be shot out from within. The tongue is hairy and there is a little, spoon-like termination. Some of the nectar taken up is eaten and digested; some stored in the honey-sac, situated in the big end of the abdomen. This and the pollen are taken home for the good of the community. Pollen accumulates in dust on the feathery hairs of legs and body, later to be collected in the two pollen baskets, one on the fourth joint of each hind leg. The worker gathers the pollen together with her legs, then scrapes it with one hind leg into the basket of the other leg. It is most interesting to watch her gathering pollen. "Sometimes she looks as if she were running about over a head of flowers to find something she had lost—now this way and now that she goes in a great hurry, then turns around and around. But she has not lost anything, and she has not gone crazy; she is merely collecting pollen as fast as she can, and if you have sharp eyes you will see her rub, rub, rubbing it with her legs back into her baskets. It is astonishing how much she can carry. When her baskets are full, she goes about with a basket of pollen attached to each of her hind legs." (Morley).

The "busy bees" not only are carriers and honey-makers, but they sometimes stop to feed from their store a hungry relative. First the two cross antennae by way of greeting, then the hungry one puts out its long tongue and proceeds to draw honey from the mouth of the other.

The senses of bees are very highly developed. The sense of vision is remarkable. The bee in proportion to its size has more eye-space than the owl, two great compound eyes and on top of its head three small eyes. No wonder it can make a bee-line for a desired goal. The antennae or feelers are of the greatest importance; without them the bee is lost. They serve as nose and ears as well as feelers. Bees take the best of care of these sensitive things, cleaning them carefully and frequently.

The bee is very clean, as neat as can be; is always cleaning itself, making use of its legs, which answer well as comb and brush. The hive likewise is kept scrupulously clean. Fresh air is let into the crowded hive by an ingenious method; some bees standing outside fanning air into the holes in the bottom of the hive, others just inside doing their share of fanning, and good circulation is thus provided.

The bee has various enemies, and keeps sentinels on the lookout for intruders. There are robber bees to be combated; the bee moth to keep from gaining entrance and laying eggs that produce larvæ destructive to both comb and honey. Then there are birds that eat bees, and bears, notorious honey thieves, will eat both honey and honey-bee.

Bees are torpid during cold weather. The queen bee may deposit as many as 3,000 eggs a day. She sometimes lives four, sometimes five, years. The workers live but a few months at the most, sometimes only a few weeks. A hive has been known to yield 1,000 pounds of honey in a single season. As a rule, bees do most of their collecting within two miles of the hive. The common black or brown honey makers are German bees. The Italian bees, large bees with yellow markings on the abdomen, are in much favor in this country. The Carniolans, from Austria, have a good standing. The Syrians have the highest honey record. As is well known, white clover makes delicious honey; the flowers of the basswood are favored of bees; in the south, orange-blossoms are used and yield a clear, delicate strain. Buckwheat flowers give very dark honey. Bees sometimes gather flowers from poisonous plants, but that happens very seldom in this country. The wild bees store honey that both man and beast search for, the store being usually found in trees.

Before the world had sugar, honey was of great importance as an article of food. While not so highly valued to-day it is nevertheless much relished. Bees are of utmost importance in the cross-fertilization of plants; it is their habit to visit bloom after bloom of the same kind. Howard says: "Without their aid the health of the plant world would suffer and its infinite variety would hardly have been achieved." Attempts to raise fruit on a large scale with no bees in the locality have proved failures; abundant crops following the introduction of bees.

There are many kinds of bumblebees. They are large and furry. A familiar one wears a splendid coat of black and yellow. They are of much value in the fertilization of flowers, especially red clover. They generally nest in a hollow in the ground, under a tuft of grass, close to the surface. In the winter the queen lives quite alone, sleeping through the cold. When the flowers bloom again, she works very busily, gathering pollen to place in her nest and lay her eggs therein, where the young larva may help itself. After a time the larva spins a cocoon about itself, from which it comes forth a bee and, if a worker, ready to help carry pollen. As with the honey bee there are the three classes, workers, drones and queen; when cold weather comes, the workers and drones die.

See *The Honey Bee*, Frank Benton, *Bulletin No. 1*, United States Department of Agriculture; Hodge: *Nature Study and Life;* Morley: *The Bee People;* Howard: *The Insect Book.*

Beech, a genus of trees technically known as *Fagus*, represented by about five species in the cooler regions of the northern hemisphere. The species of the southern hemisphere formerly included under *Fagus* are now regarded as forming another genus. The beech is prized for its beauty, largely cultivated as a shade and ornamental tree, and valued for its timber and nuts. Both in Europe and the eastern United States the beech forms extensive forests, and it is the common hardwood tree of central Europe. It is a familiar and well-beloved tree of Europe; the beeches of England are famous and whole forests of beech are common in Denmark and Germany. In the olden days great herds of swine were fed on the beech-forests of England. The ancients highly prized beech-nuts for food, used the oil therefrom for lamps, kept their records on beechen boards—the word *book* being derived from the Anglo-Saxon word for this tree, *bece*.

America has but one native beech, a tree of which we are justly proud. It is a round-topped tree; grows from 50 to 120 feet high; has abundant, thin, soft leaves, whose perfection is seldom lessened by insect attacks. The leaves are alternate, oblong-ovate, strongly veined. In autumn they turn yellow, remaining on the tree very late. The bark is of unique beauty, smooth, shining, bluish-gray, the limbs darker. The flower is inconspicuous. The fruit is a small, sweet, three-angled nut, the well known delicious little beech-nut. In Europe an oil made from the nut and called beech-oil, is extensively used for food; the nuts themselves are fed to swine, poultry, etc. The tree is widely distributed, its range being from Nova Scotia to Florida and westward. It grows best in sandy loam and limestone soil. Both Indians and early American settlers believed that a beech was never struck by lightning—a tradition that has its believers today.

Beecher, Harriet Elizabeth. See STOWE, HARRIET BEECHER.

Beecher, Henry Ward, a distinguished American theologian and author, was born at Litchfield, Connecticut, June 24, 1813, the son of Dr. Lyman Beecher. He was educated at the Boston Latin School and Amherst College, taking theological studies at Lane Seminary, Cincinnati, of which his father was then president. He began preaching at Lawrenceburg, Indiana. Later he removed to Indianapolis. In 1847 he was called to Plymouth Congregational Church in Brooklyn, which was just organized. Henry Ward Beecher was closely associated with the anti-slavery movement in the United States and gave many stirring speeches against the institution of slavery.

In 1870 he became editor of *The Christian Union*, a periodical which, since 1893, has been known as *The Outlook*. His moral character was attacked by Theodore Tilton, the charges, however, being disproved in court. Beecher resigned his position in 1881. As a preacher Mr. Beecher had great power. A rich voice, great vigor of action, a fine intellect, a warm sympathy for men of all classes and strong faith in God made him one of the greatest of pulpit orators. As writer, lecturer and orator he was hardly less gifted, his speeches and newspaper articles during the war producing a great effect both in his own country and in England. He wrote for many years for the *New York Independent*, and some of his articles were collected and published as *Star Papers*. Among his published writings are *Lectures to Young Men; Life Thoughts; Norwood*, a novel; *Aids to Prayer; Eyes and Ears; Yale Lectures on Preaching*, and *The Life of Jesus, the Christ.*

See BEECHER, LYMAN; STOWE, HARRIET BEECHER.

Beecher, Lyman, a great American preacher and theologian, was born at New Haven, Connecticut, on October 12, 1775. He was educated at New Haven, graduating from Yale in 1797. After studying theology for a year, he began preaching at the Presbyterian Church at East Hampton, Long Island, where he remained until 1810. He then went to Litchfield, Connecticut, where were born his two most famous children, Henry Ward and Harriet (Mrs. Stowe), although nearly all of his thirteen children are well known. Lyman Beecher married three times. He soon made his mark at Litchfield as one of the first pulpit orators of the time, and preached his famous *Six Sermons on Intemperance*, at a time when the cause of temperance was very unpopular. After sixteen years he was called to Hanover Street Church, Boston, and during six years of hard work here he engaged in a theological discussion with Dr. Channing. In 1832 he became president of Lane Theological Seminary at Cincinnati. While here, the Presbyterian Church divided and the Reverend Beecher turned to the New School Branch. He was charged with heresy, tried and acquitted. He spent twenty years in the seminary, resigning when his health failed. In 1852 he returned to Boston, but he was soon forced to retire from active work. The eloquent theologian removed to Brooklyn where he lived with his son, Henry Ward Beecher. His seven sons, following in their father's footsteps, were all clergymen. He died on January 10, 1863, at the age of eighty-eight. He had many eccentricities. When excited by preaching, he used to divert himself by playing *Auld Lang Syne* on the fiddle, or dancing the double shuffle in the parlor. He also kept a pile of sand in his cellar, which he shoveled back and forth for exercise. His *Sermons* and his *Autobiography* have been edited by his son Charles.

See BEECHER, HENRY WARD; STOWE, HARRIET BEECHER.

Beer, a brewed liquor made from malted grain (commonly barley) with or without other starchy material and with the addition of hops, from which comes its characteristic bitterness. In a broader application, the term includes ale, porter and stout, and sometimes is used to designate any of various fermented, undistilled liquors, made from roots or other parts of certain plants, as the old maize beer of the South American Indians before the Spanish conquest, and the rye beer of Russia.

The drink is an ancient one, known to the Egyptians 3,000 years before Christ. In western Europe, it was first brewed in the home, and not organized as an industry until 800 A.D., when the first known brewery was established at Föhring near Munich. In 1815, the church of John the Baptist at Oberföhring included a wagonload of beer in its yearly tribute to the Bishop of Freising. The first organized brewing became a monopoly of the Bavarian monks, who brewed a strong beer (*Patresbier*) for the clergy, and a weak beer (*Afterbier*) for the laity. In these first years, in forty-four glasses of *Afterbier* there was only alcohol equal to that in a single glass of wine. Many of these first beers were named for saints. In the thirteenth century the princes and the free towns appropriated the manufacture of beer for the taxes. The first known beer tax was imposed in 1286 by Duke Ludwig, who established in 1255 the Alten Hof, a strong brewery near his castle. At the end of the thirteenth century there were thirty-eight breweries in Munich alone, and beer drinking guilds had been established all over medieval Bavaria.

By 1400 the rivalry was intense, and great breweries vied with each other in the size of their enormous copper kettles, huge tuns and barrels. Wherever the water was good, brewing started. The Isar River water of Munich was perfect, and led to the celebrated Spatenbräu in 1327, and the Hackerbräu in 1417. Beer was cheap and good, and still of two kinds, a strong "double" beer and the regular beer. In 1516, Wilhelm IV issued a proclamation to protect the quality of Bavarian beer, stating that it must be brewed of barley, hops, yeast and water, and "nothing else." That standard is still enforced. "Lager," a German word meaning storehouse, was the name applied to stored or aged beer, which has qualities no other kind of beer possesses. Bräuhahn, named for the brewer Conrad Broyhan, set a standard of good quality and taste. Bock beer dates from the fourteenth century, and was named for Einbeck. It is lager beer of extra strength, greater alcohol content, and made in the springtime. Among the many other varieties of lager beer, often named for the towns or cities where brewed, Märzen is famous, brewed in the crisp March weather, ripened in wood for six months to a rich mahogany color, and drunk in autumn when the leaves are red. The seventeenth century drinkers preferred light beers, the eighteenth century dark, which has remained the prevailing taste in Munich.

Ale was originally the name for malt liquor in England before hops were introduced from Germany in 1524. It now means a beer distinguished by a high percentage of alcohol. Porter came into use in London in 1722, a dark brown malt liquor of bitter flavor and pleasant freshness. Stout is much stronger than ordinary ale or porter, dark in color, with a caramelized odor and taste.

The early settlers in America used kitchen-brewed beer. Among the pioneers of the science of brewing in America, Dr. John Ewald Siebel and Anton Schwarz are famous. Although beer has been commonly brewed in the United States, and several brands are famous, the first prohibition movements began as early as 1637, due to a shortage of grain. The Eighteenth Amendment, following the World War measure of Prohibition, made the brewing and sale of liquor illegal. Much was still brewed and sold in defiance of the law, and many breweries manufactured "near beers," similar but containing less than one-half of one per cent of alcohol, in accord with the Volstead Law. Since the repeal of the Eighteenth Amendment, in December, 1933, breweries have opened and the production of beer has steadily increased.

An interesting recent development in the history of beer, for which nutritive qualities have long been claimed, is the discovery of Professor Paul Lindner, of Berlin Agricultural College. While trying to determine the identity of "soma," a sacred drink of the ancient Persians and Indians, he found that beer made by the fermentive action of a special bacterial culture instead of yeast, and drunk with the bacteria, was an excellent remedy for digestive disorders. In the Mexican beer called "aguamiel" he discovered a fermentive organism which he named *Termobacterium mobile.* By means of this bacterium he made a scientific brew in which the alcoholic content was low and the food value high. If the beer is drunk while still cloudy, it has an agreeable taste and an excellent effect on the digestive tracts. Commercial breweries in Sweden and Vienna are manufacturing this beer for Dr. Lindner and it has been used in the Wilhelmina Hospital in Vienna with good results.

Belgium is the greatest beer-drinking country in the world, using annually about thirty-six gallons of beer for each person, although some single states in Germany use more, as Württemberg, where the annual average is forty to fifty gallons per person. From 1929 to 1930 beer consumption in Great Britain dropped thirty-three per cent. In April, 1933, the duty on beer was lowered and altered, the price reduced one cent a pint and the strength increased, with the result that the second largest increase to British Customs and Excise in that year came from beer revenue. The consumption for Great Britain increased from May 1932 to March 1934 by a total of 2,164,360 barrels. From April to December 1933, 578 breweries in the United States produced 25,808,000 barrels of beer. From 584 breweries, production amounted to 2,494,483.45 barrels in the month of January, 1934; 2,422,048 barrels in February; and 3,184,167 in March, 1934. In the latter month, 2,624,840 barrels of beer were sold in the United States. The total production by the brewing industries of the United States in the first four months of 1934 was approximately 12,000,000 barrels, on which there were taxes of $47,000,000. From June 1, 1933 to December 1933, $86,750,000 in taxes had been paid by the brewing industries.

See Brewing; Hop; Yeast.

Beersheba (*bē-ẽr-shē'bȧ*), now called **Bir es Saba** (*bēr-ĕs-sä'bȧ*), a place on the southern border of Palestine, about fifty-two miles southwest of Jerusalem. The name means the "well of the oath," and it was so called because here Abraham made a covenant with Abimelech, the Philistine king, and sealed it with an oath and a gift of lambs. In the fourth century A.D. it was a large village, with a Roman garrison. In the fourteenth century some churches were still standing there. Little is now left but a heap of ruins and two of its wells, which afford an abundant supply of pure water.

The modern town has several shops, a telegraph station, and a mosque. The town water is pumped from the "Well of Abraham," by an oil engine. The Turkish army encamped here during the World War and the attack on Egypt. On October 31, 1917, occurred the Battle of Beersheba, in which the town was captured by the British. The Australian troops, charging into the town, saved the pure water wells from destruction at the hands of the Turks.

Beethoven (*bā'tō-vĕn* or *bāt'hō-vĕn*), **Ludwig Van,** a famous German musical composer of the nineteenth century, was born in Bonn, a small university town in the Rhine Valley, on December 17, 1770. The boy Ludwig inherited his musical talent from his Flemish grandfather who had moved from Antwerp to Bonn in 1732, and become a favorite and court-musician of the Elector of Cologne. Ludwig's father, although a good musician and tenor-singer at the Archbishop-elector's court, was an ill-tempered man and too fond of drinking to provide the necessaries of life for his family. His mother, Magdalene Keverich Leym, was a domestic in the electoral palaces. Young Beethoven adored his mother and ever worked to console her for the neglect and cruelty she suffered at the hands of his father.

When Ludwig was but four years of age, his grandfather, who had contributed to the support of the family, died. The family endured untold suffering as a result of their poverty. The elder Beethoven, recognizing his son's musical ability, decided to exploit that talent. The young boy, upon reaching school-age, was given only a public school education. Long hours were spent practising the harpsichord and violin in which his father personally instructed him. Often he was made to play far into the night merely to satisfy the whims of his father upon his return from the town tavern. Many a tear Ludwig shed over the forceful practising to which he was subjected, but his talent was steadily developed. At the age of eleven Ludwig and his father set out upon a concert-tour, the latter being determined to make his child a "*Wunderkind*," a "wonder-child" like Mozart. It was in this same year that the lad mastered Bach's *Well-Tempered Clavichord,* a most difficult feat to accomplish. He was playing the violin in a theatre orchestra at this time and two years later, at the age of thirteen, became assistant court-organist. The boy was extremely fond of the organ, and his teacher, Christian Neefe, was deeply interested in his young pupil.

At the age of sixteen he travelled to Vienna to play for Mozart, his ideal. It was during his stay in Vienna that the angel of death visited the Beethoven home taking Ludwig's beloved mother to rest. Hastening back to Bonn, young Beethoven, deeply affected by the loss of his gentle friend and mother, penned in his diary,

"There was once someone to hear me when I said 'Mother,' but to whom can I now address that name?"

The young musician was now the virtual head of his family, his father being no longer able to earn a penny. He secured a pension for his father and was the sole support of his two younger brothers. It was at this time that Ludwig won the affection and sympathy of a most kind family, the Brüning family in Bonn. Frau von Brüning was a mother to the lad and he spent many hours in this home, a haven from his own stormy life. A few years later, at the age of twenty-two, he returned to Vienna and to Mozart. The return was made possible by the graciousness of the Elector Maximilian Francis and Count Waldstein, whose favor he had won. In Vienna he studied counterpoint under Johann Albrechtsberger, who failed to recognize the genius of the young man. He also studied under Franz Joseph Haydn. Young Beethoven's first appearance before the Viennese public was made with orchestra. He played his piano concerto *C Major*. The young virtuoso soon became quite popular among the aristocratic patrons of music in Vienna. The Prince and Princess Lichnowsky took him under their wing and provided him a suite in their palace.

At the age of twenty-five, Beethoven contracted a severe cold the neglect of which affected his hearing. The onset of total deafness at the age of twenty-nine caused the brilliant musician untold suffering. In the endurance of his affliction, Beethoven became tender, sympathetic and loving towards all unfortunates and deserving humankind. He became absorbed in music and wove into his compositions that tenderness and majesty which his soul could not express in words. He mingled but little with society. The musician's work went on and his compositions continued to grow in power and beauty. His third symphony, *Eroica* was composed as a tribute to Napoleon Bonaparte who, before his coronation as Emperor, was greatly admired by Beethoven as the champion of "liberty, equality, and fraternity."

Beethoven composed nine symphonies, all masterpieces, thirty-two sonatas for the piano and ten sonatas for the piano and violin. One of the master's earlier sonatas, the *Pathetique,* still enthralls its listeners, and the *Appassionata* has been described by one critic as "a volcanic eruption, rending the earth and shutting out the sky," a masterpiece in every detail. In the field of sacred music he produced the *Mass in D* and the *Mount of Olives.* Beethoven created one opera which was originally called *Leonore* and for which he composed four overtures. To-day it is known as *Fidelio.* In 1824 the *Choral Symphony,* the last of nine great symphonies, was given at Vienna. It is as a composer of symphonies that Beethoven is preëminent. The success of his last symphony tended to draw the broken musician closer into the art which had become so sacred to him. The last years of his life were burdened by the care of his young nephew, Karl, who was left an orphan at the age of ten, and grew up a dissolute and shiftless youth. Beethoven's deafness had progressed so far as to make it impossible for him to converse with anyone except through writing and the notebooks which were used for this purpose have been carefully preserved in the Imperial Library in Berlin. The music master grew steadily weaker and became an easy prey for severe colds. In the latter part of March, 1827, Beethoven became desperately ill with inflammation of the lungs and dropsy. He was greatly cheered in this, his last illness, by a gift from the Philharmonic Society of London of £100 and a beautifully bound edition of Handel's works, as a token of their deep regard for the beloved master. On March 26, during a raging thunder and hail storm, Ludwig van Beethoven closed his tragic, but tender black eyes and the great composer rested. He was buried in the *Währinger Friedhof,* while a sorrowing Vienna, a throng of more than 20,000 Viennese attended the funeral, mourned the loss of so great an artist. In 1888 his remains were removed to the Central Cemetery in Vienna. Several memorials were erected to him in Vonn, Vienna, Leipzig, and Brooklyn.

Beethoven's work is generally divided into three groups: the first includes his compositions up to 1800, his first two symphonies, six string quartets, the septet, the aria *Ah Perfido,* and the song *Adelaide;* the second group includes his compositions after 1800, the period in which his creative power and originality were in full bloom, six symphonies, the opera *Fidelio,* the violin concerto, the *Coriolan Overture,* the *Egmont Music,* the *Rasmovsky Quartets,* the *Kreutzer Sonata, Sonata in A* for cello, and fourteen sonatas for pianoforte; the third group includes those works created after his affliction and during his life of sorrow and depression, five sonatas for pianoforte, string quartets, *Opus* 127, 130, 131, 132, 135 the *Missa Solemnis, Choral Symphony* and the *Ruin of Others.* Opinions of critics differ as to which period of Beethoven's life was the greatest, but none deny his greatness as a master and his ability to instill that human feeling into all of his compositions, an ability which has endeared him to all music lovers even to-day.

Beetle, the name of the largest order of insects. They have usually four wings, but the front pair forms hard and bony covers for those behind, which alone are used in flying. They have long legs and two strong jaws for gnawing. Their food varies from hard wood to soft fruits and the carcasses of animals. They live in the water and on land, under bark and stones and on plants, digging in the ground or drilling holes in wood. There are three changes which they undergo. They are first larvæ or grubs with wormlike bodies, horny heads and three pairs of legs. Then they enter the second or pupa state, sometimes lying for years in their cocoons or cases before becoming full beetles. There are about 100,000 different kinds, varying in form, color, size or habit. Of these more than 8,000 kinds are found in the United States. The tiger beetle is named from its striped body and fierce habits. It preys on caterpillars, flies and other beetles. The bombardier beetle shoots a strong liquid at its enemies; scavenger beetles live on filth, cleaning away a great deal. Of these, some are called carrion beetles, because they live on the dead bodies of animals, and others sexton beetles, as they bury the dead bodies of animals, and lay their eggs there, and the larvæ, when hatched feed on them. The ordinary potato beetle and tumble bugs belong to this class. The latter roll balls of manure and push them along or carry them on their flat heads, and put them in deep holes after laying their eggs in them. A related species was held sacred among the Egyptians. There are many blind beetles, these living in caves and under stones. Familiar beetles are the fire-fly, glowworm and lady-bird and oil beetle. While certain species are highly useful, on the whole, beetles are pests, and the larval state lasts a number of years. They work destruction in crops, wood, lumber, fur, wool, hides, and books. Of beetles' usefulness it may be said that many fertilize flowers; some destroy plant-eating insects, and of this species the lady-bird is an excellent illustration. Enemies of the beetle are birds, rodents, frogs, reptiles, flies, and wasps. See INSECTS.

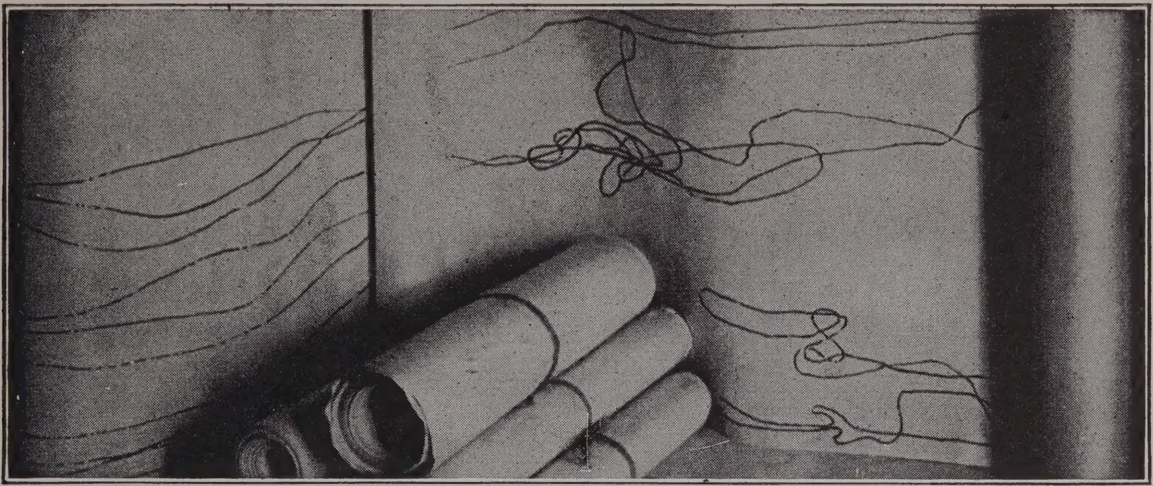
Beet-Sugar. See SUGAR.

Begonia, a genus of tropical shrubs and herbs, perennial, succulent and often bearing handsome flowers, which abounds in South America, Mexico and Central America. Some varieties of begonia are highly popular for the house and garden. The roots are often bulbous, but sometimes fibrous. The fibrous rooted begonia flowers in winter; the tuberous in summer. The begonia needs protection against excessive sun or drought; but is easily grown in the house or conservatory. An Asiatic variety, the *Rex Begonia,* is remarkable for its handsome foliage.

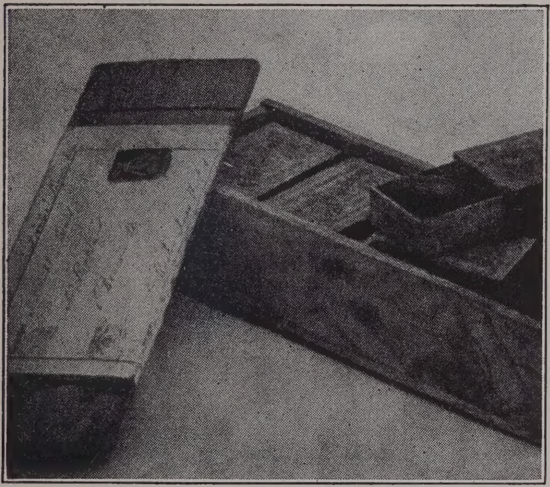
Begums or **Princesses of Oudh, The.** The wife and mother of Sujah Dowlah, Nabob of Oudh, who figured in the impeachment of Warren Hastings, England's great proconsul in India, and in Macaulay's great essay on him and his rule. In 1775 when the nabob died, the two princesses claimed that his hoarded treasure, amounting to two or three million pounds sterling, had been made over to them as their private property and could not be used as revenues of the state for the payment of tribute to the East India Company or for any other purpose. The new ruler, Asaphul-Dowlah, coaxed his mother and grandmother to dole out some of the treasure. It was the remainder of it that Warren Hastings set his eyes upon, and, with the nabob's connivance, endeavored to wring from the princesses, with what success is seen in the impeachment and famous trial of Hastings.

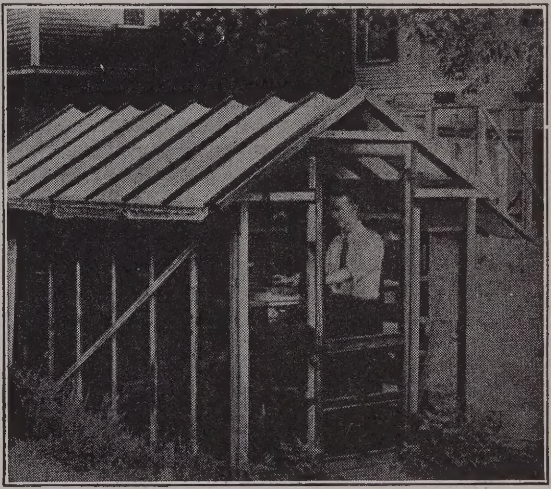
Behar or **Bihar and Orissa,** a province of British India which comprises the native states of Bihar, Chota, Nagpur and Orissa from the

A PIGMY FRIEND "WROTE" THIS

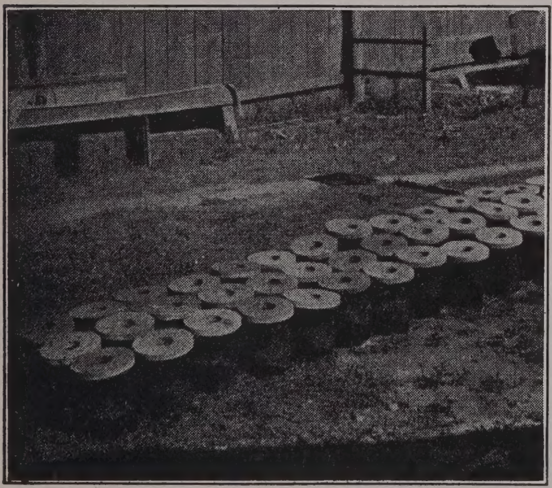


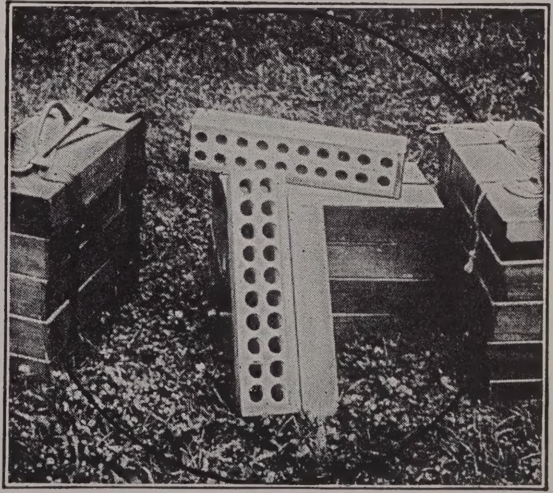
A beetle grub traveled 1¾ miles on these paper rolls. He was kept "inked" like a pen and so wrote his own record.



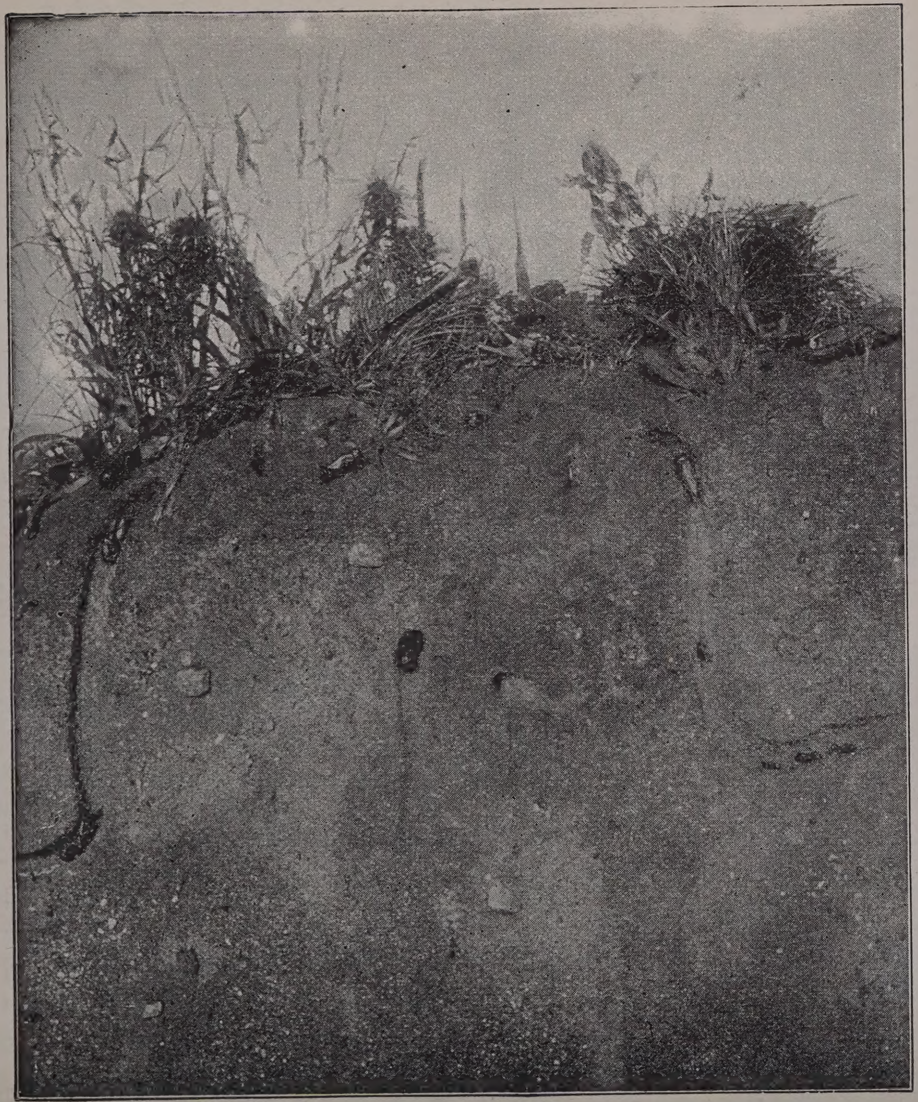


Such beetles are imported by our government because they live on destructive caterpillars, and the above record was made to learn how far they could travel in search of food. They were brought from Europe in these match boxes. On the right is a beetle breeding house.

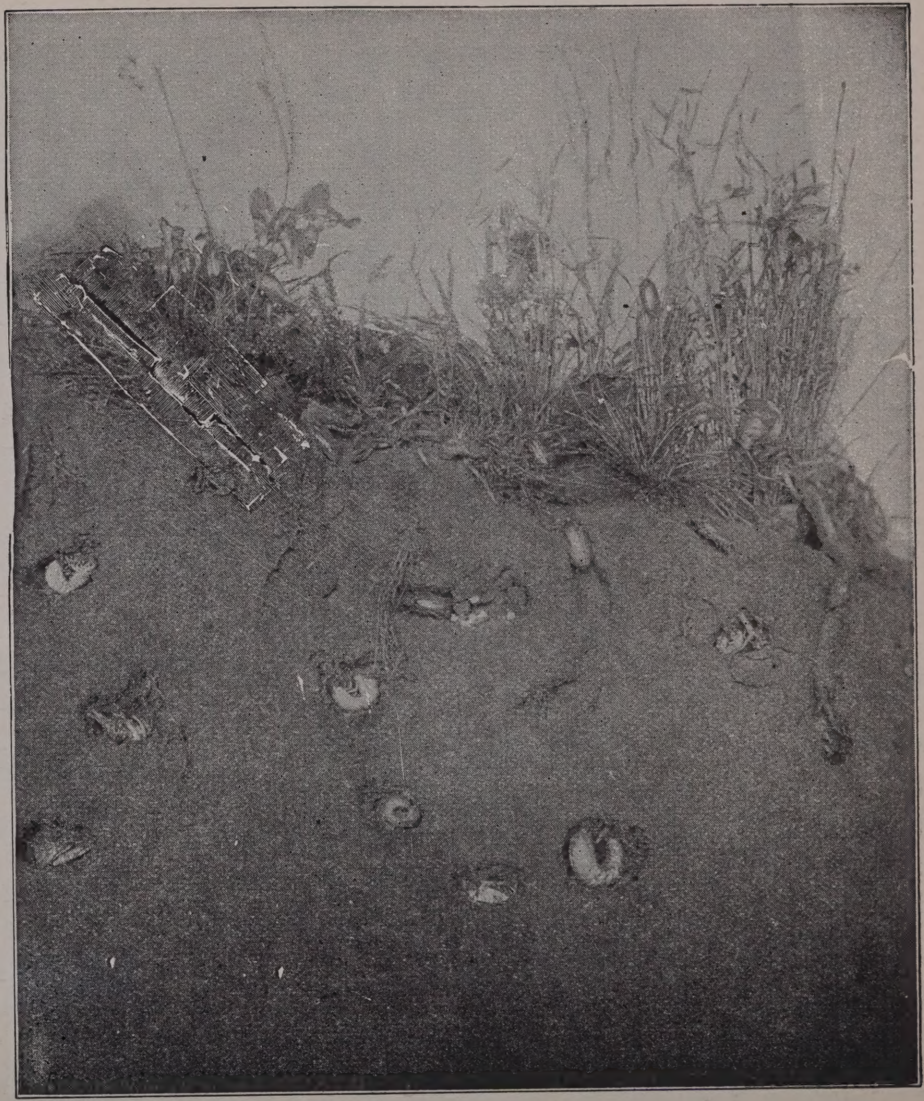




The picture on the left shows glass jars of earth containing eggs of these beetles hatching in the sun; on the right, how beetles are carried into the field for planting colonies. Every hole is the house of a beetle.



NEST OF GRASSHOPPERS UNDERGROUND.



NEST OF BEETLES UNDERGROUND.

The eggs of these insects laid on the ground, hatch out into larvae or grubs which burrow in the ground, and when developed the insects crawl to the surface.

old Province of Bengal. These were constituted as the Province of Behar and Orissa under a Lieutenant-Governor in Council in 1912. In 1919, following the Reforms Act, the administration was changed into a Governorship. The British territories of the province extend over an area of 83,054 square miles. The States of Orissa and Chota Nagpur cover an area of 28,648 square miles. The principal towns of the province are Patna, which in 1931 had a population of 159,690; Bhagalpur, 83,847; and Gaya, 88,005, which is a famous site for pilgrimages of Buddhists and Hindus. The majority of the population are Hindus. The entire population has been estimated at approximately 37,000,000.

The principal industry of the province is agriculture. The most important crop is rice which is cultivated on nearly one-half of the arable land. Other important crops include sugar-cane and maize. In 1930 there were 4,800 acres in Bihar devoted to the cultivation of indigo. An important coal area is situated in the Manbhum and Hazaribagh districts of Chota Nagpur. In 1930 there were fifteen million tons of coal produced here. The total coal production for India in 1930 was 22.7 millions. The districts of Hazaribagh, Monghyr and Gaya are one of the most important sources of mica in the world. There are important iron and steel works, the Tata Iron and Steel Works, situated at Jamshedpur.

There is an Executive Council composed of two Members, one an Indian, for "reserved" subjects of the province, and for the "transferred" subjects two Indian Ministers. The Legislative Council is composed of 103 Members, seventy-six of whom are elected and twenty-seven nominated. For administration purposes there are five divisions extending over twenty-one districts. The capital is Patna. During the summer heat, however, the seat of the Government is maintained at Ranchi.

In 1930 there were 883 secondary schools with 127,437 pupils, and 28,135 primary schools with 879,877 pupils. In 1922 a Board of Secondary Education was constituted. The University of Patna, which was constituted in 1917, is an affiliating University. Other institutions of higher learning include the College for Engineering at Patna (Bihar); a School at Cuttack (Orissa); the Tirhut Technical Institute, and the Ranchi Technical School. In 1930 there were 3,583 students enrolled in the Arts and Science Colleges.

Belfast (*bĕl′fȧst*), the capital of Northern Ireland and an important commercial city, is situated in the northeastern part of the island at the head of Belfast Lough or Bay on the banks of the River Lagan, about twelve miles from the Irish Sea. Several bridges span the River Lagan and many pleasant villas lie on either side of the bay. Picturesque hills to the north give the city a pleasant appearance. The history of Belfast dates back into the sixteenth century when a small fishing village occupied the site of the present city. The House of O'Neill controlled the fortress which was maintained here. In 1613 James I granted a charter to this city and its importance as a port of trade gradually increased. In 1777 the manufacture of cotton textiles was begun, an industry which has increased in importance down to the present day. Belfast has become the principal linen city of the world. The spinning of flax, of an excellent quality, and the weaving of linen keep many workers in Belfast's immense factories constantly occupied.

In 1913 a Provisional Government for Ulster was proclaimed as a result of efforts to develop Irish self-government. The opening of the World War brought to a halt any action of the new government and it was not until December, 1920, that two parliaments were created, one for Northern Ireland and one for the Irish Free State.

In addition to its thriving linen industry, Belfast also has flour mills, distilleries, shipyards, foundries, sawmills, and manufactures of rope, felt, tobacco, carbonated waters, and tea making machinery. As a commercial city Belfast ranks fifth in the United Kingdom. Its port is under the administration of a board of commissioners elected by the tax-payers and shipowners. Alexandra Dock is one of the most spacious in the United Kingdom. One of the largest graving docks in the world was opened here in 1911. Belfast is an important shipbuilding center, an industry which was begun in 1791. To-day approximately 30,000 men are employed in the ship yards.

Among the many fine public buildings in Belfast are the Public Library, the Royal Academical Institute, Queen's University, and the City Hall. The city has been the scene of several riots resulting from religious opposition, particularly in 1880, 1884 and 1907. Belfast has ever been the champion of Presbyterianism. There are several Presbyterian colleges situated here as well as Methodist Episcopal institutions. In 1612 Belfast was a small village of but 120 thatched huts. According to the most recent census report (1926) the population was 425,126.

See IRELAND, NORTHERN; LINEN.

Belgian Congo. See CONGO, BELGIAN.

Belgium (*bĕl′jĭ-ŭm*), one of the smaller states of Western Europe, is bounded on the north by the Netherlands, on the east by Germany and the Duchy of Luxemburg, on the south by France and on the west by the North Sea. It has an area of 11,752 square miles, a coast line of sixty-two miles and a frontier of 831 miles. Most of the country is low and part of it, particularly in Flanders, is protected from the sea by dykes. In the southeast a branch of the Ardennes highlands gives a rugged appearance although in no place do these hills attain a height of more than 2,000 feet. The principal rivers of Belgium are the Scheldt and the Maas or Meuse. These waters, which rise in France and flow into the North Sea, are navigable throughout their course in

Belgium. With their branches and a system of canals, Belgium is accorded an abundant water supply. The most important tributary of the Scheldt is the Lys; of the Meuse, the Sambre.

Production and Industry. The principal industries of Belgium are mining and agriculture, and the metal and textile industries. The land is rich in minerals, including coal, iron, lead, copper, zinc and marble. In 1932 there were 2,784,000 metric tons of pig iron produced from fifty-six blast furnaces; 2,809,000 metric tons of steel ingots; 99,000 tons of zinc; and 21,414,000 tons of coal. There were 245 coal mines in operation in which 172,390 miners were at work.

An intensive agriculture is engaged in, every inch of soil being carefully cultivated. In 1931 there were 1,836,036 hectares (a hectare is 2.471 acres) under cultivation. Cereals were cultivated on 39.37 per cent of this area; vegetables upon 1.20 per cent; root crops on 14.30 per cent and forage on 41.00 per cent. In 1932, there were 418,500 metric tons of wheat harvested from 380,380 acres; 102,300 tons of barley from 81,510 acres; 760,400 tons of oats from 728,650 acres; 601,000 tons of rye from 548,340 acres; 1,736,100 tons of sugar beets from 128,440 acres; and 4,439,000 tons of potatoes from 423,840 acres. Eighty-four per cent of the country's needs are met with home production. Only twenty-six per cent, however, of the wheat consumed is produced at home. Much of the Belgian farmer's wealth lies in his livestock holdings. This country is famous for its horses and cattle. According to the livestock report of 1932 there were: horses, 241,989; cattle, 1,767,536; and pigs, 1,235,214.

Belgium is a great industrial nation, as it must of necessity be if its dense population is to be supported. Factories of many kinds are to be seen everywhere. The chief manufactures are linen, woolen, cotton and silk goods, lace, leather, and metals. There are also sugar refineries, distilleries, steel works, and blast and puddling furnaces. In Flanders we find Belgium's oldest industry, that of linen. From Brussels, Malines and Bruges, the world markets receive the lace for which Belgium is famous. The metal industry centers about Mons, Namur, Ghent, Liége, and Charleroi. The glass industry, which is becoming increasingly important, has been developed within recent years. All industrial production has been greatly increased since industrial plants have been modernized, and electrical power developed. After the close of the World War there followed a period of reconstruction in which industry was revived. To-day Belgium is frequently called "the land of smokestacks"; its neighbor, Holland, is known as the "land of windmills."

Commerce and Communications. For many years Belgium led Europe in commerce and to-day is still one of the principal trading countries of the world. The principal imports of the country are wool, cotton, flax, hides, building wood, iron and steel, machinery, coal, chemical products, bitumen, zinc ore, wheat, and wine. The most important exports are manufactures of wool, cotton, flax, leather, glassware, iron, steel, zinc products, and sugar. The principal countries with which Belgium trades are, in order of importance: France, United States, United Kingdom, the Netherlands, Germany, the Republic of Argentina, and the Belgian Congo. The principal port of Belgium, and the greatest port of Continental Europe, is Antwerp.

On July 1, 1933, the merchant fleet of Belgium comprised 175 steamships of 393,094 gross tons; thirty-six motor ships of 61,690 gross tons; and one sailing vessel of 1,423 gross tons. In 1932 there were 1,036 miles of navigable waterways (including rivers and canals) in Belgium. On July 30, 1933, two tunnels under the Scheldt at Antwerp, one for vehicular use and the other for pedestrians, were put into operation.

The railways throughout the country are controlled by the *Société Nationale des Chemins de Fer Belges.* There are 3,102 miles of railway in operation by the national railway system. The greater part of Belgium's highways are paved with stone. In 1931 there were 6,438 miles of roads, 5,440 of which were State roads; 981 miles, provincial roads; and seventeen miles, conceded roads. Belgium also maintains a well-developed telegraph and telephone system. In 1931 there were 31,668 miles of public telegraph wires, and 6,222 miles of telegraph lines.

Population. Belgium is the most densely populated country in Europe. In December, 1930, the population was officially estimated at 8,159,824, or about 691 inhabitants to the square mile. There are two principal groups in Belgium, Flemings and the Walloons. The former are in the majority. They dwell in Flanders, Limburg and Brabant, including Antwerp. Their language is Flemish. The Walloons speak French, and this difference in languages has long been a point of controversy between the two groups and culture has been hindered somewhat by the many different dialects in use. The people are in the main Roman Catholic, but religious liberty is granted all citizens. The Protestant (Evangelical) Church is under a synod.

The most important cities of Belgium, with their estimated populations in 1930, are: Brussels, capital, 207,838 (with suburbs, 839,581); Antwerp, 294,902 (with suburbs, 424,269); Ghent, 169,322 (with suburbs, 217,039); Liége, 166,820 (with suburbs, 253,377); Bruges, 51,686 (with suburbs, 78,000); Malines, 61,648; Ostend 44,352; Verviers, 43,696; and Louvain, 39,147.

Education. Illiteracy in Belgium has been decreasing in recent years. The schools are supported by local taxation, and each commune must have at least one primary school. In 1932 there were 8,549 primary schools; 134 state high schools, forty-four of which are for girls;

seven normal schools for the training of secondary teachers and eighty-one for the training of elementary teachers. Both French and Flemish are spoken in the schools. Institutions of higher learning are situated at Brussels, Louvain, Ghent and Liége. The universities at Ghent and Liége are State institutions. Since October, 1930, Ghent University has been a Flemish institution. In 1931-32 the University of Brussels had 2,271 students; Ghent, 1,881; and Lauvain, 4,071. A Colonial University is maintained at Antwerp. The Royal Academy of Fine Arts is also situated at Antwerp. Two State agricultural institutes are maintained at Gemblaux and Ghent, and a State veterinary school at Cureghem. Opportunities for higher education are also offered by twenty-four royal athenæums; twenty special athenæums; five communal and provincial colleges, and ten private colleges. Numerous private or free schools are also maintained, mostly under ecclesiastical supervision.

Government. The Constitution of 1831 defines Belgium as a "constitutional, representative, and hereditary monarchy." Legislative power rests in the King, the Senate, and the Chamber of Representatives. The two houses are convoked, prorogued and dissolved by the King. In accordance with the revision of October, 1921, of those sections of the Constitution regulating the organization of the legislative power, all elections for the Senate and Chamber are held on the principle of universal manhood suffrage. In parliamentary elections only those women may vote who are widows, not remarried, who lost husbands or bachelor sons in the World War, or who were condemned to imprisonment or subjected to preventive detention, for political reasons, during German occupation of Belgium.

Members of the Senate are elected for four years, partly directly and partly indirectly or by provincial councils and the Senate itself. There are forty provincial senators in the Senate. Those Senators elected by the Senate itself are elected in the proportion of one-half of the preceding category.

Members of the Chamber are all elected directly by the electoral body for four years. Their number, 187 (in accordance with the law of March 6, 1925), is proportioned to the population, and there can be but one for 40,000 inhabitants.

Both houses convene annually in November and must be in session for at least forty days. The King may convoke these governing bodies on special occasions.

The reigning Sovereigns are King Leopold III and Queen Astrid, who automatically succeeded to the throne on February 23, 1934.

Local government, in provinces and communes, is largely autonomous. In commercial elections all Belgians over twenty-one years of age, may vote. Each province is under the administration of a governor appointed by the Crown, and a provincial council elected by the people. Each commune has a college composed of the burgomaster, the president and a fixed number of aldermen.

History. The history of Belgium as a separate kingdom dates from the year 1830. Prior to this date Belgium formed a part of the Low Countries from the readjustment of Europe in 1815. Its provinces, however, have figured in history from the days of the Caesars. They often served as the battle-ground of Europe, and the Battle of Waterloo was fought on the soil of Brabant, a province of this kingdom. A Provincial Government was established by a National Congress on October 14, 1830, following a revolution which broke out in Brussels on August 25, 1830. Its Constitution was proclaimed in 1831. Prince Leopold of Saxe-Coburg was elected King of Belgium by the National Congress on June 4, 1831. In 1865 King Leopold died and was succeeded by his son Leopold II who reigned until 1909. On December 17, 1909, upon the death of Leopold II, a new king ascended the throne, in the person of Albert I, who reigned until February 17, 1934.

The neutrality and inviolability of Belgium were guaranteed by Austria, France, Great Britain, the Netherlands, Prussia and Russia, by the Treaty of London, April 19, 1839. On August 2, 1914, Germany violated Belgian neutrality and invaded the kingdom in an effort to enter France from the north. Belgium was devastated by the oncoming hordes of Germans, and it was necessary to move the seat of government first from Brussels to Antwerp, and finally to Havre. It was not until after the signing of the Armistice that Germany evacuated Belgium, and on November 19, 1918, King Albert, who was the heart and soul of his people's heroic defense of their country against the invading armies of Germany, re-entered Brussels.

Under the Treaty of Versailles, Eupen, Malmedy and Maresnet were ceded by Germany to Belgium, thereby increasing Belgium's area 382 square miles and adding 64,520 inhabitants to its population. These cantons, on March 5, 1925, were joined to the province of Liége. The neutrality of Belgium was also guaranteed and the kingdom recognized as a sovereign state.

The people of Belgium and the world at large suffered a distinct loss in February 1934, with the death of that esteemed monarch, King Albert I. The accession of a new king to the Belgian throne was an event of the utmost importance to the whole of Western Europe and to France in particular. The charming personality, keen wisdom and democratic spirit of Albert had accomplished much towards maintaining tranquility among the political factions within Belgium and establishing a friendly relationship with France. Belgium had not been without its internal difficulties even during the reign of Albert. Communistic riots occurred in Brussels, the Flemish question, which has been a disturbing problem ever since the close of the World

War, taxed even the ingenuity of Albert, and the economic crisis which gripped the world in 1929 has taken its toll in Belgium as elsewhere. Since the close of the World War, Belgium has been a strong advocate of the League of Nations and strove desperately to maintain peace throughout Western Europe. Her foreign policy has been closely allied with France in presenting a strong Franco-Belgian front against Germany since the signing of a military defensive pact between the two nations in 1920. It is little wonder then that the coming of a new king should be so eagerly and tensely awaited by the outside world. His policies of government, both at home and abroad, were unknown to Belgium's neighbors and were a source of international concern.

Belgium is a constitutional and hereditary monarchy. Succession to the throne is automatic. Upon the untimely death of Albert at Marche des Dames on February 18, his son, Crown Prince Leopold, the Duke of Brabant, succeeded to the throne. The entire country mourned the distinguished King Albert and on February 22, the late king, who had ruled so benevolently for twenty-five years, was interred with impressive ceremonies in the royal crypt at Laiken. On February 23, the young Crown Prince became Leopold III, King of Belgium.

Undoubtedly the most pressing problem confronting the young king is the Flemish question. Although the disturbance is one of long standing, the first Flemish nationalism movement having appeared in 1830, its seriousness has been accentuated recently by a marked growth of Flemish Fascism. In 1931 the Verdinaso, or the Consolidated Netherlandish Nationalist party, commonly known as the Dinasos, was organized under the leadership of Joris van Severen. Since that date its membership has grown to about 20,000, including auxiliary organizations which have sprung up. The chief auxiliary bodies are the Jongdinaso-Vendels (the Youth Movement) and the Dinaso Militie, a corps of soldiers somewhat akin to the Storm Troopers of Germany. The party organ is a weekly periodical known as *Hier Dinaso!* The activities and propaganda of the party and auxiliary groups are decidedly Nazi in character. The Dinasos are easily distinguished by the green houses from which brilliant orange pennants float, and the Dinaso uniform which is fashioned after the Nazi Brown Shirts. The Verdinaso program advocates the creation of a corporative State to be known as the Greater Netherlands, a state by which Flanders and Holland would be united.

The growth of Flemish Fascism has resulted in the growth of a Walloon Fascist organization in Wallonia known as the Belgian National Legion. Unlike the Verdinaso, however, the movement in Wallonia is advocating a united Belgium, a Walloon dictatorship and a friendly relationship with France. The sympathics of the German Nazis lie with the movement of Flemish nationalism, the Verdinaso, while France looks favorably upon the Wallonian movement with the hope that its success will frustrate any attempt on the part of Germany to further its expansion program.

The separatist program of the Flemings, demanding "either administrative autonomy with a new constitution which would transform Belgium into a Flemish-Walloon Federation, or complete independence or union with Holland," was expertly handled by Albert's liberal policy which, however, did not appease the Flemish malcontents. This nationalist group is gaining power each day, spurred on in its activities by Nazi support and today it presents a complex problem to young King Leopold. Tradition in Belgium holds that upon the accession of a new king the Cabinet must present its resignation. On February 23, Premier Count de Broqueville proffered this resignation to King Leopold. The new king, however, declined to accept the resignation of his father's Cabinet and declared his intentions of conforming to the general policies of his illustrious father. His actions will be closely watched since any internal dissension in Belgium may easily became an international problem.

On February 27, 1934, the International Peace Conference opened in Brussels. Many Countries were represented at the conference which was officially opened by Signor Giannini of Italy.

See Albert I; Congo, Belgian; Leopold I, II, III; World War.

Belgrade (*bĕl-grād'*), the capital of Yugoslavia, is situated at the junction of the Save and the Danube, a sort of key position to the Upper Danube. The name of the city means "white town." Belgrade has been the scene of many battles and has been successively in the hands of Romans, Greeks, Hungarians, Bulgarians, Serbians, Turks, Austrians and French. It became the capital of Serbia in 1862, but the citadel was not relinquished by the Turks until 1867. To-day the city is especially important because of the great volume of trade which passes through it from Austria, Hungary and Yugoslavia. The principal exports are grain, fruits, meats and live stock. The imports consist chiefly in manufactured articles. Once a Turkish city, it is year by year becoming a modern European one.

On December 2, 1914, Austrian forces entered the city after having shelled this site since the close of July in that same year. The Serbians had fled the city, but aided by British launches re-entered Belgrade on December 13, 1914. The city finally fell, however, on October 9, 1915, and it was not until November 1,1918, that the Serbians reoccupied the city. The city itself had been devasted by continual bombardment. Since the close of the World War, and the Treaty of Versailles which created Yugoslavia, reconstruction had been put under way and Belgrade is gradually assuming a modern appearance. There are well developed street railways, telephones, electric lights, waterworks and striking buildings throughout the city. Among the most outstanding buildings are the royal palace and the National Theatre. Opposite the theatre is a bronze statue of the murdered Prince Michael III. The Royal Serbian Academy of Sciences, containing the national library of more than 60,000 volumes, is situated here. The chief railroad of the Danube Valley passes through the city en route to Istanbul. In 1931 the population was 241,542. See YUGOSLAVIA.

Belisarius (*bĕl-ĭ-sā'rĭ-ŭs*), a Byzantine general, was born about 505 A.D., at Germania in Illyria. From the emperor's body-guard he rose in rank to the chief command in the army. The wisdom of Justinian's appointment was apparent, for Belisarius with Narses helped to restore to the Roman Empire part of its lost possessions. In 530 he defeated the Persians, and in 532, when civil disturbances threatened to disrupt the empire and displace the emperor, Belisarius was recalled, and with his followers restored order. In 535 he conquered Sicily, and in 540 defeated the Ostrogoths in Italy and captured their king, Vitiges. From 541 to 542 he was engaged in subduing the Persians. In 559, after being in retirement for ten years, Belisarius conquered the Bulgarians. Upon his return to Constantinople he was accused of conspiracy. Although he was imprisoned for several months on the accusation, Justinian believed him innocent and restored his rights and property of which he had been deprived. Many narratives are related of Belisarius. One in particular tells of how his eyes were plucked out and he became a street beggar. Others tell of his imprisonment in a tower. These legends are, however, unfounded.

See JUSTINIAN; OSTROGOTHS.

Belize (*bĕ-lēz'*) or **British Honduras**, a British Crown Colony, is situated on the Bay of Honduras in the Caribbean Sea, about 600 miles west of Jamaica. It forms the southeastern part of the Peninsula of Yucatan, and extends over an area of 8,598 square miles. The Cockscomb Mountains, which soar 4,000 feet in the air, are the highest elevations in the region. The land along the coast is swampy. The colony is governed by a Governor and Commander-in-Chief who is assisted by an Executive Council of seven members, and a Legislative Council consisting of six official and seven unofficial members. The land was probably first settled by woodcutters from Jamaica in 1638. Settlers continued to found homes here until 1798. In 1786 the Home Government appointed a Superintendent. The settlement was declared a Colony in 1862, subordinate, however, to Jamaica. In 1884 it became an independent colony.

The principal exports of the colony are mahogany, log-wood, sugar, coffee, cotton, cocoanuts, bananas, plantains, and India-rubber. Mahogany and logwood are its staple products.

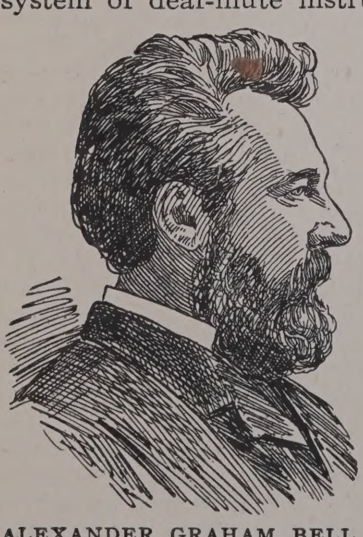
In 1903 the Bank of British Honduras was established at Belize, the chief town. In 1912 the Royal Bank of Canada took over the business of the local bank. There are six Government savings banks in the colony. In 1931 the population of the chief town and seaport, Belize, was 16,687; of the colony 51,347.

Belknap (*bĕl'năp*), **George Eugene**, an American engineer and naval officer, was born in Newport, New Hampshire, on January 22, 1832. In 1852 he was appointed a midshipman in the navy. In the years which followed he became successively lieutenant-commander, commander, captain, commodore and rear-admiral. He was present in China in 1856 at the taking of the Barrier Forts. During the Civil War he took part in the bombardment of Charleston Harbor. He achieved distinction while engaged in deep-sea sounding in 1873. At this time he was Commander of the *Tuscarora*. While thus engaged in the north Pacific Ocean, he made discoveries relating to the topography of the ocean bed, which attracted the scientific world. He invented an apparatus for determining the substance of the sea floor. In 1885 he was appointed superintendent of the United States Naval Observatory. In 1889 he became rear-admiral and was retired in 1894. He died at Key West, Florida, on April 7, 1903. One of his most important publications is *Deep Sea Soundings*.

Bell, a hollow metallic vessel usually shaped like a cup with flaring edges, having a clapper or tongue, which gives forth a ringing sound when struck. From the earliest times bells of some sort have been in use. For their manufacture, the material most approved in all ages has been a mixture of copper and tin called bronze; but the proportions of the two metals vary. For a long time in Europe, two parts of copper to one of tin were considered the best ratio, but at present much more copper is used, the ratio being about thirteen parts to four. Steel, silver and glass have also been used for bells but are not as good as bronze. With any metal the pitch of the bell depends upon the ratio between the thickness of the striking-place and the diameter. Bells were used among many early nations in religious ceremonies, and so came naturally into use in Christian churches. From Italy their use spread over Europe between the sixth and twelfth centuries. Most of these bells were hand-bells, made of thin plates of hammered iron, bent into a four-sided shape, fastened with rivets and bronzed. One of these early bells, called The Bell of Patrick's Will, is still preserved at Belfast. When bells came to be hung in steeples or belfries, they were at first small; but were gradually made larger. The largest bell in the world was cast in 1734. It was called the Great Bell or Monarch of Moscow. It is over twenty feet in height and diameter, and weighs 193 tons. It fell down during a fire in 1737, was damaged, and remained unrestored until 1837. In that year it was raised and now forms the dome of a unique chapel made there.

by digging out the space beneath it. Other large bells are the Great Bell of Pekin (53½ tons), and the *Kaiserglocke* of Cologne cathedral (26 tons), made out of 22 French cannon. The largest bell in the New World is in the cathedral of Nôtre Dame at Montreal (29,400 lbs.). Many early superstitions have gathered around bells; they were believed to drive away storms and pestilence and to put out fire. From religious customs connected with them bells have acquired a sacred character. At one time they were tolled when any great personage was passing out of the world, and they are now often tolled after deaths and before funerals. The ave bell, sanctus bell and vesper bell are among those used in the Roman Catholic church. The curfew bell was rung to warn people to put out their fires and lights at eight o'clock in the evening, and this eight o'clock bell is still rung in many parts of England and Scotland Many churches now have peals or chimes, on which tunes are played. Tune-playing bells are sometimes sounded by means of a cylinder, just as a barrel organ; others are played with keys by a musician. The best chimes consist of from eight to twelve bells. The muffled peal, which gives one of the finest effects, is rung with a leather cap over half the clapper, making the chimes first clear and then dull. In casting bells, the core or part which fills the inside of the bell is first made of brickwork covered with soft clay; then the outer mold or cope is fashioned in the form of the outer surface of the bell and fitted over the core, leaving a hole in the top for the escape of the air. The melted metal is then poured in. Electric bells have of recent years been extensively used in offices and houses. See ELECTRICITY.

Bell, Alexander Graham, one of the inventors of the telephone, was born at Edinburgh in 1847, was educated at the High School and in Germany, and in 1872 introduced into the United States the system of deaf-mute instruction which his father had invented. Having for some time experimented on the transmission of sound by electricity, he exhibited his telephone at Philadelphia in 1876, and its success from that time on was assured. He has also invented the radiophone. After 1881 he lived at Washington.



ALEXANDER GRAHAM BELL

Considered as the inventor of the telephone, Bell's great merit lies in the fact that he, at the same time with Elisha Gray, recognized that human speech cannot be transmitted by means of an intermittent current, but *requires an undulating current.*

Bell saw that an intermittent current might reproduce the pitch and amplitude of a sound, but without a continuous current one could not reproduce the quality of the sound. He died in 1922.

Bell, Henry (1767–1830), a Scottish engineer, born in Linlithgowshire, who served his apprenticeship to his uncle, a millwright, but later became interested in ship-modelling under John Rennie of London, the notable civil engineer. Returning to Helensburgh, on the Clyde, in 1808, he pursued his experiment with the steam engine and achieved fame by constructing and sailing on the Clyde the steamship *Comet*, the herald of steam navigation in the Old World. Fulton, it is asserted, gained his ideas of steam navigation on water highways from Bell.

Bell, Henry Haywood (1808–68), American rear-admiral, was born in North Carolina and in 1823 entered the United States Navy as midshipman. He early saw service in China and in 1856 was in command at the attack on the Barrier Forts, at Canton. In 1862, during the War of the Rebellion, he acted as fleet captain of the West Gulf Squadron and led a division of gunboats in the attack upon Forts St. Philip and Jackson, part of the defences of New Orleans. In the following year, he took command of the blockading squadron during the temporary absence of Admiral Farragut. In 1865 he was in command of an United States Squadron operating in the East Indies, and two years later met his death by drowning in an attempt to pass in his barge over the bar at the mouth of Osaka River, Japan.

Bell, John, a notable Tennessee publicist, speaker of Congress and founder of the Whig party, was born near Nashville, Tenn., in 1797, and died at Cumberland Iron Works, Tenn., September 10, 1869. Graduating in 1814 from the University of Nashville, he studied law, and in 1817 became a senator for his state. From 1827 to 1841 he served in Congress, and for a year was speaker of the house. In 1841 he became secretary of war in President Harrison's cabinet, but resigned the office when President Tyler abandoned the Whig party. After some years of retirement, he from 1847 to 1859 was United States senator, and in 1860 became candidate of the Constitutional Union party for president. He took no part in the Civil War, as he condemned secession, though he abjured coercion.

Bell, Robert, I.S.O., D.Sc., M.D., C.M. F.G.S., F.R.S.C., F.R.S., was born in Toronto, June 3, 1841, and educated at McGi

University, where he was graduated in science, medicine and surgery, later studying chemistry in Montreal and under Lord Playfair at Edinburgh. He joined the geological survey of Canada in 1857, and has ever since been engaged in extensive topographical and geological surveys throughout the Dominion, Bell River being officially named after him. He has been royal commissioner on the mineral resources of Ontario, 1888–9, a member of the American Institute of Mining Engineers, member of the government geographical board, professor of chemistry and natural science in Queen's University, Kingston, from 1863 to 1867, and is honorary chief of the Algonkin Indians of Grand Lake. His published writings aggregate two hundred titles, including geology, geography, biology and folk-lore.

Bellaire (*bĕl-lâr′*), a city in Belmont County, Ohio, on the Ohio River, five miles south of Wheeling, West Virginia. The region around Bellaire abounds in coal, iron, limestone, cement and brick clay. The city has manufactories of stoves, carriages, glass, foundry and machine-shop products. Bellaire has all the improvements of a progressive city. Population, 17,000.

Bell′amy, Edward, American economist, journalist and story writer, was born in Massachusetts, Mar. 26, 1850, and died there May 22, 1898. Entering journalism as a profession, he was for a time on the staff of the *New York Evening Post* and later was editorial writer and critic for the Springfield *Union*. Owing to poor health, he made a voyage in 1876 to the Sandwich Islands, and after this began to write short stories for the magazines. His chief success, however, was his socialistic novel, *Looking Backward*, which, issued in 1888, had a sale of over 300,000 copies in this country. Inspired by the book, "Bellamy" communities became for a time the vogue. His later works embrace *Equality*, *The Blind Man's World* and other stories.

Bellefon′taine, Ohio, a city, the county seat of Logan County on the Cleveland, Cincinnati, Chicago and St. Louis and the Toledo and Ohio Central railroad, 30 miles north of Springfield and 45 northwest of Columbus. Besides a large railway plant and carshops, the city, which dates from 1818, has a number of manufactures of iron bridges, carriage bodies, tools, harness, etc., besides the city's gas, electric-plant and water-works. It has also a flour-mill. It has a number of churches and several good schools. Population, 10,000.

Belleville, Ill., county-seat of St. Clair County, southwestern Illinois, 14 miles southeast of St. Louis, is beautifully situated in the midst of rolling and somewhat broken country. It has good railroad connections and has nearby shipping facilities furnished by the Mississippi. It has fifteen large foundries, extensive brick works, factories for the manufacture of farm implements, rolling mills, hosiery mills and shoe factories. It possesses some fine civic buildings, good public schools, many churches, a large convent and handsome residences. It has 25 miles of paved streets. Population, 25,000.

Belleville is a manufacturing city of 9,117 souls, admirably placed on the north shore of the Bay of Quinté and on the Grand Trunk Railway. It is the county seat of Hastings County, Ontario, the southern terminal of the Midland Railway, and is touched by a line of lake steamers on Lake Ontario.

Bellevue, Ky., a city, in Campbell County, on the Ohio River, opposite Cincinnati, and on the Chesapeake & Ohio Railroad. Settled in 1871, it was incorporated in 1871. An attractive residential suburb of Cincinnati, it is connected with the latter by electric railway. Population is now 8,000.

Bellicent. In the Arthurian legends Bellicent is represented as the daughter of Gorlois and Ygerne and the half-sister of King Arthur. She was the wife of Lot, King of Orkney. When King Lodogran hesitated to give his daughter Guinevere to King Arthur in marriage because of the doubts about Arthur's parentage, Bellicent won his consent to the marriage. See Tennyson's *Idylls of the King*.

Bell′ingham, Wash., a city in Whatcom County, on Puget Sound and on the Canadian Pacific, C. M. & St. Paul, Great Northern and the Northern Pacific railroads, 70 miles north of Seattle, west of Mount Baker and near the British Columbia boundary. It has a fine land-locked harbor, an inlet of the Strait of Georgia, and has communication by steamer not only with Seattle, but with San Francisco and the nearby city of Victoria the capital of British Columbia. Besides its shipping trade, chiefly in lumber, it has a large number of shingle and saw mills and several large salmon canneries. Population, 36,890.

Bellini (*bĕl-lē′nē*), **Vincenzo,** a composer of operas, was born at Castania, in Sicily, in 1802, and was the son of an organist. He was sent to the conservatory of Naples, where he studied composition. After a number of early operas had made him known in Italy, he wrote, in 1827, the opera *Il Pirata*, which gave him a name in the musical world. For the next eight years he wrote a fresh opera almost every year, and visited Paris and London. When only thirty-two years old, and before his powers were fully developed, he died near Paris, Sept. 21, 1835. Among his best works are *Norma*, *I Puritani* and *La Sonnambula*. His operas are replete with sweet melodies.

Beloit (*bē-loit′*), a city of Rock County, Wisconsin, situated on Rock River, ninety-two miles northwest of Chicago. It is a handsome town, built on the bluffs overlooking the river, and has a well-laid out park. Among its manufactures are paper-mill and wood-working machinery, steam-pumps, gas and gasoline engines, agricultural implements, shoes, hosiery and paper. The river furnishes excellent power for manufacturing, and Beloit has the service of two railroads. It is the seat of Beloit College, a well-equipped, endowed school. Population 25,000.

Belt of Calms, a narrow zone where the winds are weak and irregular, often dying into a calm. It lies along the line of greatest heat around the globe, and shifts north or south with it. The northeast tradewinds are north of the belt, the southeast ones south. In this belt the tradewinds become hottest and lightest.

Belt of Heat, the regions on and near the equator, where the air is hot all the year, because at noon every day the rays of the sun strike straight down or nearly so. The slant of the sunshine varies but little. Day and night always are each about twelve hours long. The change of seasons is slight, and there is no winter.

Beluchistan, SEE BALUCHISTAN

Bel'videre, Ill., a city, the county seat of Boone County, on the Kishwaukee River, and on the Chicago & Northwestern Railroad, about 75 miles west-northwest of Chicago. It is an active industrial center, and is situated in a fine fertile region with large dairying interest. Its industrial establishments embrace automobiles, bicycles, sewing machines, boilers, screen doors, flour-mills, etc. Its water-works automobiles, bicycles, sewing machines, boilers, are owned and operated by the city. Belvidere has a number of fine public buildings, schools and churches. The population is about 7,500.

Benares (*bĕn-ä'rĕz*), the most sacred city of the Hindus. Sacred bulls wander among its 1,450 Hindu temples and shrines and 272 Mohammedan mosques, pilgrims bathe in the Sacred Well, or Pool of Knowledge, and the Hindu dead are cremated in the Burning Ghat. The broad flights of stairs leading to the temples, standing on the high banks of the crescent sweep of the Ganges, present a view of striking beauty. The chief industries are the manufacture of muslins and silk shawls. Population about 210,000.

Benedict XV, elected Pope on September 3, 1914, as successor to Pope Pius X. He was born at Pegli, Italy, November 21, 1854, and died at Rome, January 21, 1922. Giacomo della Chiesa came of an ancient, noble family of Genoa, and to please his father he studied law. But the call of the Church was too strong, and at 24 he was ordained priest. As secretary to Cardinal Rampolla, then papal muncio at Madrid and later papal secretary of state, Chiesa gained experience which was of the greatest value to him later.

In 1907 the future Pope was created archbishop of Bologna, and in May, 1914, only four months before his election as Pope, was made a cardinal. As Pope he faced problems such as no Pope before him had ever confronted. Practically the entire civilized world was at war, and Catholics were ranged on both sides. The Pope maintained the strictest neutrality, at the same time making every effort for peace. In addition to his public appeals, he was constantly trying through secret diplomatic channels to secure peace. The strain of these years wore him out, and caused his death at the comparatively early age of 67.

Bengal (*bĕn-gal'*), the most important of the seven great provinces of British India. It lies in the west of India, between the Himalayas on the north and the Bay of Bengal on the southeast. It is nearly as large as Spain, and its population is about 52,668,000, or nearly that of the population of the United States. Its capital is Calcutta. Eastern Bengal and Assam have, besides Bengal proper, an area of 106,130 square miles with a population of 30,961,459.

Political Divisions and Cities. It is divided into nine large provinces, each under a commissioner, while these are again divided into forty-six districts, each with a magistrate. Besides Calcutta there are few large cities; though there are over thirty towns, each with upwards of 20,000 inhabitants. Calcutta, including its suburbs, has a population of about 1,250,000. There are about 2,000 miles of railway and 5,110 miles of telegraph.

Climate. The climate is generally hot and damp, and the rainfall in Chera Punji is the greatest reported in the world. Destructive cyclones and floods are frequent, earthquakes are not unknown, and famine, unhappily, is occasionally rife.

Natural Resources. The land contains a good deal of mineral wealth, especially coal, iron and copper. On the seacoast are the trackless forests, which are the home of the tiger and the rhinoceros. The land is very rich, owing to the dressing of soil brought down every year by the immense network of rivers, the largest of which are the Ganges and the Brahmaputra.

Occupations. Agriculture is the main occupation of the people, and among the products are indigo; jute, from which certain cloths are made; cinchona, from whose bark quinine is made; the opium poppy; varieties of rice; grains, spices, cotton, sugar and drugs. The yearly exports amount in value to about $200,000,000.

Education. Bengal stands far ahead of the rest of India in its provision for education. There are five colleges, connected with the University of Calcutta, and a fine system of public and private schools and special schools. (For history see INDIA.)

Bengali, a modern East Indian dialect, with a literature; it is akin to Hindustan and is spoken by nearly 45 millions of natives in the presidencies and chief provinces of British India. With Hindustani, it is the language commonly heard in Calcutta and the Valley of the Ganges. It is related to Sanskrit, which has had an influence upon its inflexion and syntax, like other languages of the Aryan family. Its literature embodies translations of the chief Sanskrit epics, notably the *Mahabharata* and the *Ramayana*. See Dutt's *Literature of Bengal*; also dictionaries of Bengali, Sanskrit and English.

Benghazi. See Barca.

Benguela (*bĕn-gä'lȧ*), a district and port in Angola, a colonial possession of Portugal on the west coast of Africa. It lies south of French Congo, and southward also from Sao Paulo de Loanda, the capital town of the district. Its trade is mainly with Portugal, its chief exports being coffee and rubber. Malachite, copper and iron, together with petroleum and salt, are found in the province. Its soil is fertile and produces a luxuriant vegetation; but the climate, especially near the coast, is hot, humid and unhealthy. Besides the shipping trade in the coast towns, the province of Angola has now considerable railway traffic inland, with 250 miles of railway in operation. From Lobito Bay near Benguela a 1,200-mile railway is being built to connect in Northern Rhodesia with the Cape-to-Cairo road.

Ben'jamin, meaning "son of the right hand," was the youngest and best beloved of the sons of Jacob. He was at first named Benoni by his mother Rachel, but after her death the father changed the name to Benjamin. He was the founder of one of the two tribes of Israel whose warriors were noted for their skill in archery and for their cleverness with the left hand. On entering Canaan the tribe numbered 45,600 warriors above twenty years old. The territory of the tribe lay on the west side of the Jordan, between the tribes of Ephraim and Judah Saul, the first king of Israel, was a Benjamite. After the death of Solomon, Benjamin along with Judah formed the kingdom of Judah, and on the return from the captivity these two tribes formed the main element of the new Jewish nation. The Apostle Paul belonged to the tribe of Benjamin.

Benjamin, Judah Peter, an American lawyer and politician, was born in 1811 in the West Indies, of Jewish parents, who at a later day emigrated to the United States. He practiced law in New Orleans and became interested in politics, acting first with the Whigs. He was elected United States senator from Louisiana in 1852, and on the slavery question sided with the Democrats. When Louisiana seceded, he withdrew from the senate and became a member of Jefferson Davis's cabinet as attorney-general. He was later secretary of war and then secretary of state until the downfall of the Confederacy. He then went to London, where he was called to the English bar and practiced with success until 1881, when he retired. He died in Paris, May 6, 1884. He published a treatise on the *Law of Sale of Personal Property*.

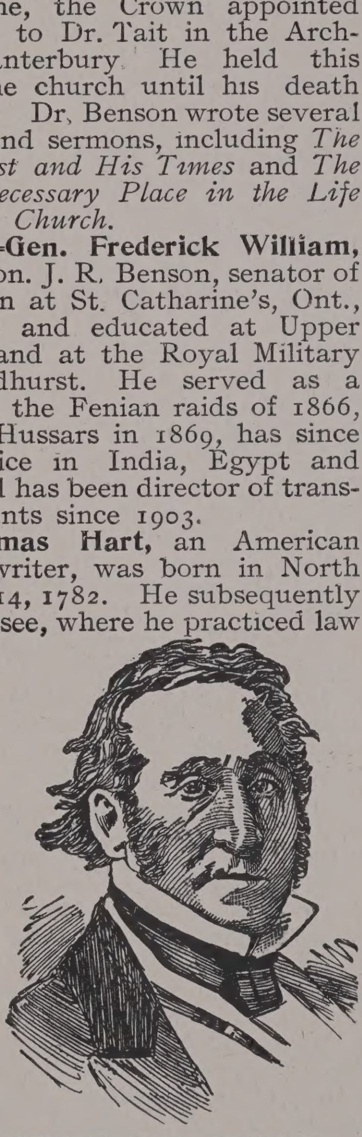
Ben'nett, James Gordon, founder and proprietor of the *New York Herald*, was born in Scotland in 1795, and studied to be a Roman Catholic priest, but, abandoning that idea, emigrated to America in 1819. For a livelihood, he tried teaching, proofreading, writing and lecturing, and was connected with several newspapers, but remained a poor man, when in May, 1835, he issued the first number of the *New York Herald*. By his industry and sagacity he made the paper a great success, and soon became a wealthy man. His paper was the first one to publish the stock lists and a daily money article, and many other original features were afterwards added. When steam communication was opened with Europe, he crossed the Atlantic and made arrangements for correspondence from all countries. The first speech ever reported in full by the telegraph was sent to the *Herald*. The paper was independent in politics, but generally supported the Democratic party. He died in New York, June 2, 1872, in the Roman Catholic faith. He bequeathed the *Herald* to his son, James Gordon Bennett, who is now its editor and proprietor. The present editor, together with the *London Daily Telegraph*, supplied the funds for Stanley's journey across Africa (1874–7) from Zanzibar to Lakes Victoria and Tanganyika and down the Congo to the Atlantic.

Ben Nevis (*bĕn nĕv'ĭs*), a mountain of Invernessshire, Scotland. One of the loftiest peaks in Great Britain, it has a height of 4,400 feet, with a precipice of 1,500 feet on the northeast side. A road was built to the summit in 1883, where a weather observatory has been erected. A weather report is sent daily from this elevation and transmitted by telegraph over Scotland.

Ben'nington, capital of the county of the same name in Vermont. The place is famous because of the battle fought there in the Revolutionary War. On Aug. 16, 1777, Gen. Stark, at the head of a column of Green Mountain Boys, defeated a force commanded by Col. Baum, sent from Gen. Burgoyne's army to capture the public stores at Bennington. Six hundred British prisoners were captured In 1891 a monument commemorating this event was dedicated; it is a shaft 301 feet in height. The anniversary of this battle has been celebrated almost every year since, and in 1877 a centennial celebration was held, at which the then president of the United States and his cabinet, the governors and legislatures of Massachusetts, New Hampshire and Vermont, besides many prominent men of the army and navy and of other states, were present There are valuable deposits of brown hematite ore in the town and also considerable manufacturing, including knit goods, woolen goods and machinery. Population 11,000.

Benson, Arch′bishop Edward White, an English prelate and primate of all England (1882–96), was born in 1829 and died in Flintshire, Wales. After graduating at Trinity College, Cambridge, he taught for a while at Rugby, was head master of Wellington College, chancellor of Lincoln Cathedral, and in 1877 was consecrated Bishop of Truro. In 1882, on the recommendation of Mr. Gladstone, the Crown appointed him as successor to Dr. Tait in the Archbishopric of Canterbury. He held this high office in the church until his death October 10, 1896. Dr. Benson wrote several religious works and sermons, including *The Seven Gifts*, *Christ and His Times* and *The Cathedral: its Necessary Place in the Life and Work of the Church.*

Benson, Maj.-Gen. Frederick William, son of the late Hon. J. R. Benson, senator of Canada, was born at St. Catharine's, Ont., August 2, 1849, and educated at Upper Canada College and at the Royal Military College at Sandhurst. He served as a volunteer during the Fenian raids of 1866, joined the 21st Hussars in 1869, has since seen much service in India, Egypt and South Africa, and has been director of transports and remounts since 1903.


THOMAS HART BENTON

Ben′ton, Thomas Hart, an American statesman and writer, was born in North Carolina, March 14, 1782. He subsequently moved to Tennessee, where he practiced law and served in the state legislature. After the War of 1812, in which he took part, he removed to St. Louis and there edited the *Missouri Inquirer*. In 1820 he was elected to the United States senate, where he served for thirty years, taking a strong stand on the questions which were then agitating the country. Because of his earnest support of President Jackson in his war on the United States Bank, he earned the name of Old Bullion. He opposed the compromise measures of 1850, and Calhoun's measures intended to provide for the extension of slavery. His stand on the latter measure lost him his seat in the senate. In 1852 he was elected to the house of representatives; but two years later he was defeated as a candidate for re-election, and devoted the remainder of his life to literary work. He published *Thirty Years' View or A History of the Working of the American Government from* 1820 *to* 1857. He also abridged the Debates of Congress from 1789 to 1856. He died at Washington, April 10, 1858.

Benton Harbor, Mich., a city in Berrien County, on the St. Joseph River and on the Pere Marquette, the Cleveland, Cincinnati, Chicago & St. Louis and other railroads. It lies back one and one half miles from Lake Michigan, but is connected with it and its fine harbor by a ship canal, and from the harbor steamboat lines ply to Chicago, Milwaukee and other ports on the lake. It has a considerable trade in the product of the important mineral springs adjoining the city; while it also ships largely of flour, furniture, machinery, besides fruit, beet-sugar, pickles, cider and vinegar. Population, 14,000.

Be′owulf, a long and notable Anglo-Saxon poem of the 8th or 9th century, now among the treasures of the British Museum, in London. The poem or epic, it is thought by scholars, existed prior to the colonization of Britain by the Anglo-Saxons, and was probably brought to Britain by the early Teutonic invaders. Its hero is represented as a thane and, later, as a king of the Swedes, while the field of action is in Swedish and Danish territory.

Beranger (*bā′rän′zhā′*), **Pierre Jean de,** a great song writer of France, was born in Paris, August 19, 1780. He was brought up by his grandfather, a tutor, and later by his aunt, an innkeeper, who filled him with republican ideas. After a few years of work as a printer, he retired to a Paris garret, where he gave himself to literature and study But poverty soon again forced him into the world. He received aid from Lucien Bonaparte, and three years later was made a clerk in the Imperial University. In 1815 he published his first collection of songs, which made him the poetic champion of the masses who opposed the Bourbons. He wrote always for the working classes, for whom he had a deep sympathy, and he was so popular among them that his verses were repeated from mouth to mouth before they were printed, so that it has been said that he is the only poet since printing was invented who did not need its service. In 1821 two volumes of poems which he published were so strongly republican in sentiment that he was brought to trial, fined 500 francs and sentenced to three months in prison; and in 1825 another set of songs caused him to be again imprisoned. While in prison he was visited by the great literary men of the day, including Victor Hugo, Dumas and Sainte-Beuve. In 1848 he was elected by more than 200,000 voters to represent the department of the Seine in the constituent assembly, but after a few days he resigned and retired to his quiet work and study, where he remained until his death, July 17, 1857. His songs have a lightness and wit, a smoothness of movement and, at times, a deep humanity and pathos, which make their author still the favorite singer of his countrymen. Besides his poems he wrote the story of his own life

Berbers (*bĕr'bĕrs*), an interesting people living in the mountainous regions of Barbary and in the northern parts of the Great Desert They are called Kabyles in Algeria, Shelluh in Morocco, and those in the desert, Tuaregs or Tawareks by the Arabs. They are the descendants of the earliest inhabitants of northern Africa, and though they have in their veins an admixture of negro blood, and have been conquered at different times by the Phœnicians, Romans, Vandals and Arabs, they are still in many respects a distinct and peculiar race. Their number is between three and four millions. They are fierce and cruel, and usually at war either with their neighbors or among themselves They have herds of sheep and cattle, till the soil, manufacture swords, guns and gunpowder, and work the mines of iron and lead in the Atlas Mountains. In appearance they are strongly built and of middle height, with a complexion varying from red to reddish brown. They are followers of Islam.

Berea (*bĕr-ē'ȧ*) **College,** a non-sectarian, co-educational institution situated in Berea, Ky. In 1906 there were 1,018 students enrolled The president is Wm. G. Frost, Ph.D., D.D. The college was founded in 1855 by anti-slavery Southerners, and was intended for the youth of the mountainous district of the South. For many years it admitted both white and colored students, but in 1904 the legislature of Kentucky passed a bill prohibiting co-education of the races in any of the educational institutions of that State. The object of this bill was to break up the co-education of races in Berea College.

Beresford, Lord Charles, born 1846, rear-admiral of the British navy, gained distinction by his skillful operation of the gunboat *Condor* at the bombardment of Alexandria in 1882. In this action he silenced one of the strongest Egyptian batteries. He served in Egypt under Lord Wolseley, and commanded the naval brigade in battle after battle. In 1875 he accompanied the Prince of Wales on his visit to India. Lord Charles visited the United States in 1899 and again in 1906, on the latter occasion to claim a legacy. He has earnestly endeavored to promote a good understanding between the United States, England and Germany upon the Chinese question. He advocates the "open-door" policy. He is a prominent member of Parliament, and has written books upon the Chinese question and the life and times of Lord Nelson.

Ber'gamot, Oil of, made of the rind of the fruit of the so-called Bergamot orange, now cultivated in the south of Europe. The oil is used in making pomades, fragrant essences, cologne, etc., and also in diluting the expensive oil of chamomile. It is of a pale yellow color or almost colorless. It is obtained by distilling or by grating down the orange rinds and then subjecting them to a strong pressure. One hundred Bergamot oranges will yield about two and a half ounces of oil. The name comes from Bergama, a city in Asia Minor, the ancient Pergamos.

Bergen, Norway, founded in 1070 A.D., is the center of the fish trade of the Northmen; and has now some 75,000 inhabitants. Bergen lies to the northwest of Christiania about 186 miles. It is a picturesque city, being surrounded on three sides by water, and enclosed upon the fourth side by mountains three thousand feet in height.

Bergerac (*bĕr'zhe-rȧk'*), **S. Cyrano de** (1619–55), a noted French dramatist and novelist, with a gift for the writing of burlesque romance and satire. Born at the Chateau de Bergerac in Perigord, he grew up a man of the world, entered the army, and is known to have fought many duels. He gave free play to his satirical humor, which at times got him into trouble, particularly with the Jesuits of his era, whom he satirized, as in his political letters and quips he satirized Cardinal Mazarin, Prime Minister of France during the minority of Louis XIV He is doubtless best known, however, by his *Comic Histories of the States and Empires of the Moon*, with a companion work on the Sun. The influence of these books can be traced in the imaginative and whimsical later work of Dean Swift, Jules Verne and Edgar Allen Poe. Bergerac's other work embraces a comedy of character entitled *Le Pedant Ione*, and *Agrippine*, a tragedy. Bergerac is the theme of a brilliant modern drama by Edouard Rostand, *Cyrano de Bergerac*, played with acceptance not only in France, but in England and the United States. Bergerac, as has been often remarked, was the first author to use the novel to teach natural science, as he was the first author of note in France to manifest the influence of early English fiction.

Bergh, Henry, a philanthropist and author, was born in the city of New York, of German parents, in 1823. After he graduated from Columbia College, he wrote several poems, dramas, sketches, and served as secretary of legation to Russia; but on returning from abroad, he determined to devote the remainder of his life to the cause of dumb animals. On April 10, 1866, after several years of hard work, in speaking, lecturing and working in the street, in the court-room and in the halls of legislature, the first Society for the Prevention of Cruelty to Animals was incorporated by the legislature of New York, and since then most of the states and territories have organized societies. Cruelty to animals of all kinds is dealt with by the society, and a great work has already been done in educating public opinion to the sense of the need of reform. There is now a very large membership, and many friends have donated money liberally to its support, one patron, Mr. Lewis Bonard, giving his entire fortune of $150,000. Out of this movement has also grown the Society for the Prevention of Cruelty to Children, which has become almost as widespread as the original society. Henry Bergh died in New York, March 12, 1888.

Be'ring (or Behring) Sea, a part of the North Pacific Ocean, commonly known as the Sea of Kamchatka, is bounded by Kamchatka, Alaska, the Aleutian Islands and Bering Strait, which connects it with the Arctic Ocean. The strait was passed through first by a Siberian named Deschner, in 1648, and later the sea and strait were explored by Bering, a Danish navigator in the employ of Peter the Great, in 1741. The latter died on Bering Island, one of the Aleutian group. The seal fisheries of Bering Sea caused a sharp dispute between the United States and Great Britain on behalf of Canada. These fisheries, owned and operated by Americans directly for their own benefit, but indirectly for the benefit of the world, were in danger of being entirely destroyed by the lawless acts of the Canadian seal-fishers or sealers An agreement was concluded which permitted the United States to put a stop to the acts of the Canadian sealers and provided that the whole dispute be settled peaceably by a board of arbitrators.

Bering Strait, a narrow water-passage north of the Aleutian Islands and Bering Sea, in the Northern Pacific, connecting the latter with the Arctic Ocean. It is in the vicinity of long. 170° W., having on the east of it Alaska and on the west the projecting peninsula of Siberia, in Russian Asia. It was at an early era discovered by a Russian Cossack navigator, named Deshneff, and subsequently explored by Captains Bering and Cook. At its narrowest part it is about 40 miles in width, and has a depth varying from 150 to 250 feet, the deeper water being on the Asiatic side. St. Lawrence Island lies to the south of the Strait, in Bering Sea.

Berkeley (*bĕrk'lĭ*), a town in Alameda County, California, in Oakland Township, is situated on the east shore of San Francisco Bay opposite the Golden Gate. It is five miles from the city of Oakland, which lies immediately south of it, and eight miles from San Francisco. The Southern Pacific and Santa Fe railroads both pass through the town. Communication with San Francisco every twenty minutes is furnished by the Southern Pacific local trains and the Realty Syndicate furnishes a like number of the best equipped electric trains every hour. A large number of manufactures and planing mills are located near the water front. The University of California, the State Agricultural College and the State Institution for the Deaf, Dumb and Blind are located here. The population, which is growing quite rapidly, is now 65,000.

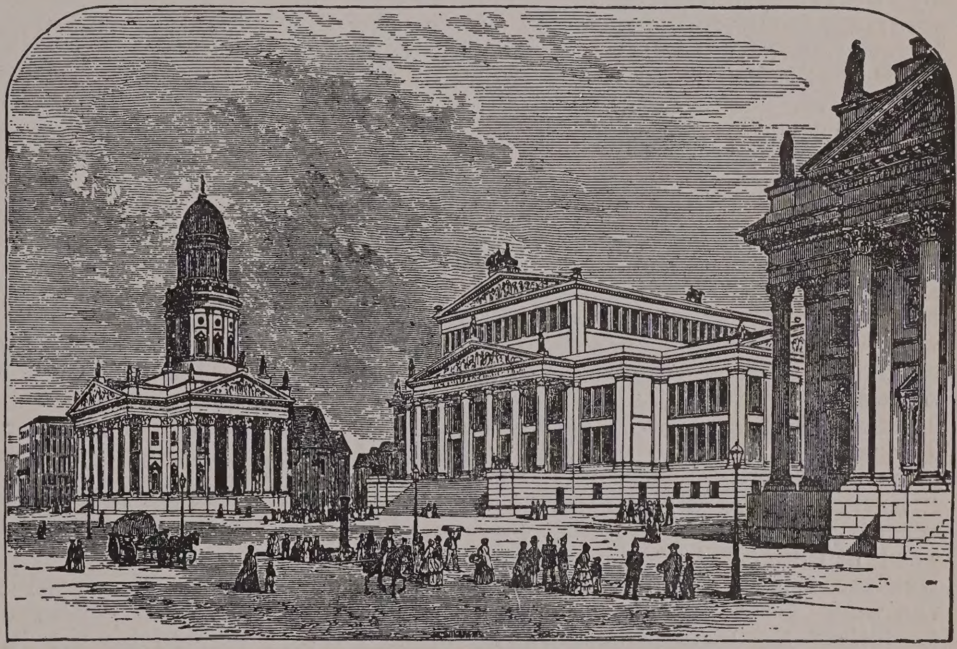
There is a complete school system, including manual training, domestic science, primary and grammar schools and high schools, including a Polytechnic High School. Within the last two years, bonds to the amount of one-half million dollars have been voted for school purposes, and municipal bonds for a like amount for other municipal improvements have also been voted.

Berkeley, George, bishop of Cloyne, was born near Kilkenny, Ireland, in 1685. After graduating at Trinity College, Dublin, he remained there thirteen years as a fellow, studying and writing on philosophy. His theory, called *Idealism* was that the world exists only in our thoughts and that the objects around us are only ideas, which God, as the highest reason, causes to pass before our minds. At Trinity, he had become a friend of Dean Swift, and in 1713 he went to London, where Swift introduced him into the brilliant society of the reign of Queen Anne He next traveled for some years through France and Italy On his return he wrote a great deal on social questions. In 1728, having formed a plan to convert the American savages, he came to America, and for three years lived in Rhode Island, writing, studying and preaching. He then gave up his work and returned to England, leaving his library of 800 volumes and his estate in Rhode Island, called Whitehall, to Yale College. He was soon after made bishop of Cloyne, in the south of Ireland, where he lived for eighteen years, and then removed to London and died in January, 1753. Besides his writings on philosophy and social questions, Bishop Berkeley wrote the well-known stanzas *On the Prospect of Planting Arts and Learning in America*, in which occurs the famous line: "Westward the course of empire takes its way."

Berkeley, Sir William, colonial governor of Virginia in the time of Charles I and Charles II of England, was born near London in 1608, and died in England in 1677. He was commissioned royal governor of Virginia in 1641, and being a monarchist and partisan of the crown, he held, for nearly thirty-five years, this colonial outpost, with the exception of the interval of the Commonwealth. During the Cromwellian period Virginia was an asylum for many Englishmen of rank who were loyal to the crown; the colony, indeed, was among the last of the crown possessions abroad to acknowledge the Protector's authority. Berkeley, in his later years, grew irascible and intolerant, and behaved despotically toward those who took part in Nathaniel Bacon's rebellion (see the latter). He was opposed to free schools, to printing and to religious liberty, and was recalled to England in 1676.

Ber'lin. A city of 13,664 in Waterloo County (Ontario), one of the busiest manufacturing centers in all Canada. Is rapidly growing. Amongst other articles of manufacture may be mentioned furniture, leather, buttons, machinery and felt goods. Population largely of German descent, churches, schools, private residences noticeably attractive, evidences of thrift and progress everywhere, the County of Waterloo is one of the richest and most fertile in all Canada. Another important manufacturing town, Waterloo, lies immediately adjacent to it.

Berlin, the capital of Prussia and since 1871, of the German Empire, the third largest city of Europe, lies on the banks of the River Spree, which flows through the center of the city from southeast to northwest. Its population is 2,070,695, and it covers an area whose circumference is nearly thirty-five miles The city dates as a small fishing village as far back as the 13th century, but the beginning of its rapid growth and prosperity was not made until the Great Elector, Frederick William (1640-88), united the separate duchies of which Prussia is now formed, and made Berlin the capital of the new state. Among the fine buildings for which the city is noted are the royal palace, with 700 apartments, and other palaces; the royal library, with over 710,000 volumes and 25,000 manuscripts; the old and new museums, with their fine collections and art galleries; the national gallery; the arsenal; the royal theater; the opera house; the guardhouse; and the university. Throughout the city and in the parks are numerous statues of national heroes, and monuments, such as the great Column of Victory, 197 feet high. The street called from its double avenue of limes *Unter den Linden* is one of the finest streets in Europe. The University of Berlin is now one of the foremost in Germany. Founded in 1810, it has had many famous professors and scholars It now numbers over 414 professors and lecturers with over 5,000 students, and as many more non-matriculated students. Besides the university, there are the Academy of Sciences, one of the most learned institutions in Germany; the military academy and academies of art and architecture; and the schools of mining, agriculture, artillery, engineering, music, etc. The Zoölogical and Botanical Gardens are also worthy of mention. The commerce of Berlin, carried on by the Spree, the canals and many railroads, with its manufactures, places it in the front rank of the mercantile cities of the continent. Grain, cattle, spirits and wool are the staples of trade. The exchange is daily visited by 3,500 persons. The main branches of industry are woolen weaving, calico printing and the manufacture of engines and other machinery, also of iron, steel and bronze wares, drapery goods and confections. Together with Leipsic, Berlin holds the first place among German cities in the publishing trade. Owing to the great strides in German manufactures and in the establishment of Germany's former colonies, the capital became a still greater financial and imperial center.



BERLIN—ROYAL THEATER AND NEW CHURCH IN THE GENSDARMENMARKET

Berlin, N. H., a city in Coos County, on the Androscoggin River and on the Grand Trunk and the Boston & Maine railroad, 16 miles north-northeast of

Mount Washington. It has large lumber and pulp mills, with an extensive annual product and employing a large force of men. Its other industries, all of which are usefully served by good waterpower, include shoe manufacture and other activities. The city is lighted by electricity, and possesses a public library, several fine church buildings and schools, as well as a number of attractive residences. Population, 11,780.

Berlin, Treaty of. After the Russo-Turkish War of 1877, what is known in Europe as the Eastern Question arose to trouble the diplomats, and a congress of the great powers met at Berlin, at the call of Prince Bismarck, to settle the affairs of the Balkan Peninsula and other boundary disputes. As a result of the conference, the Treaty of Berlin was drafted and signed by the representatives of the respective powers, modifying in some degree the Treaty of San Stefano, previously concluded between Turkey and Russia. By the Treaty of Berlin, Russia received from Rumania the territory called Bessarabia, lost by the Crimean War, and she acquired the fortress of Kars and the port of Batum; Bulgaria, the territory between the Danube and the Balkans, became virtually independent; Montenegro acquired full freedom; and Servia and Rumania became independent kingdoms. Bosnia (q. v.) and Herzegovina were at the same time transferred to the temporary rule of Austria, while Cyprus became a British possession; and Greece acquired Thessaly and a portion of Epirus. The Turkish empire in Europe was thus reduced to narrow limits.

Berlioz (*bêr'lê-ōz'*), **Hector,** a great but eccentric musical composer, was born in 1803, at Côte St. Andre, near Grenoble, and was the son of a physician. Disregarding the wish of his father, who wanted his son to follow his own profession, he studied music at the Conservatoire in Paris, winning several prizes. In Italy, where he studied for a year, he became acquainted with Liszt and Mendelssohn. On his return to Paris, in 1832, he brought out some of his compositions, but their success was so small that he had to eke out his living by writing for musical journals and giving concerts. In his foreign concert tours he was far more successful than in his own country, being received with enthusiasm and offered several lucrative posts. He died at Paris in 1869. His *Faust* is his most popular musical composition. His symphonies, such as *Romeo and Juliet;* his opera, *Beatrice and Benedict;* his overtures, as *The Carnival of Rome;* and his sacred pieces, as *The Childhood of Christ* and his *Te Deum,* are among his most successful achievements. His literary work is also of a high order. Liszt, Heine and Balzac, the great novelist, were among his intimate friends.

Bermu'das, The, or **Somers' Islands,** are British possessions in the Atlantic, southeast of Cape Hatteras, 680 miles from New York. They were named from the Spaniard Bermudez, who first sighted them in 1522, and from the Englishman, Sir George Somers, who was shipwrecked there in 1609. They are said to be 360 in number, but many are mere specks, the whole being only about 12,000 acres in extent. They are composed of coral sand and are surrounded by a living, growing reef of coral. They are important to the British government as a half-way station between its possessions in Canada and the West Indies. Hamilton, the seat of government, is situated on Main Island. The next in importance is St. George's Island, which has a strongly fortified harbor. On Ireland Island is the Bermuda floating dock, built in England and towed out in 1869. It is 381 feet long and 124 feet wide. A large number of the islands are without name or inhabitant. Because of the balmy and temperate climate the Bermudas have become in winter a popular resort, for Americans as well as for English; and St. George's and Hamilton have many hotels. Although the soil is poor, yet, because of the absence of winter frosts, crops can be prepared for March, April, May or June, and so their early potatoes, onions, tomatoes and other garden vegetables bring high prices in the New York markets to enrich the Bermudians. The population is 17,535, more than half of which is colored. A governor and council of six members, appointed by the crown, and an assembly of thirty-six, four being elected by each of the nine parishes into which the Bermudas are divided, make up the governing body. The chief town is Hamilton, population, 2,627.

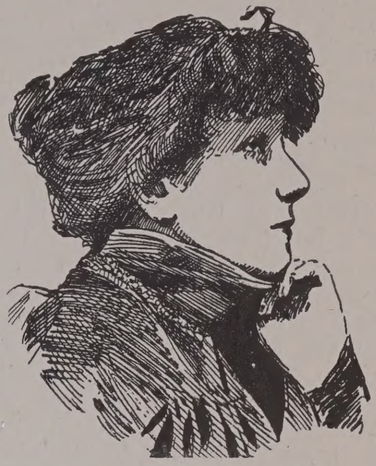
Bern or **Berne,** the capital of the canton of Bern and of Switzerland, lies on a promontory formed by the River Aar, which surrounds it on three sides. The population, 85,264. Berne is the first city in Switzerland, although Zürich, Bâle and Geneva have each larger populations. The houses are massive, built of freestone, resting on arcades, which are lined with shops and furnish a covered walk on both sides of the streets. A bridge which spans the Aar is one of the largest bridges in Switzerland. The Gothic cathedral, mint, hospital and university are among the fine buildings of the city. The trade is chiefly in dress fabrics and hats. The figure of a bear is conspicuous in the ornaments of the place, in allusion to the origin of the name Bern, and a bear's den is maintained by the municipality at public expense. The area of the canton is 2,675 square miles, with a population, 642,744.

Bernadotte (*bẽr'nȧ-dŏt'*), **Jean Baptiste Jules,** king of Sweden and Norway as Charles XIV, was born at Pau, in the south of France, January 26, 1764, the son of a lawyer. He entered the army as a private, but his promotion was rapid after the outbreak of the French Revolution. In 1794 he was a general in command of a division, and in 1804 he was made a marshal in the army. In 1797 he was sent with 20,000 men to re-enforce the army of Italy, which led to his first meeting with Napoleon. Of all Napoleon's marshals, Bernadotte was the one least under his influence, and refused to help him in any of his political designs. But his generalship was highly thought of by his chief. He commanded the center at Austerlitz and helped to prevent the allies from turning the right flank of the French army. With a separate command, he defeated the Prussians at Halle and forced Blucher to surrender. He defeated the Russians at Mohrungen, commanded a corps of Saxons at the battle of Wagram, after which a dispute with Napoleon caused his resignation. Bernadotte was also, for a time, minister of war and ambassador to Vienna. He was elected crown prince of Sweden in 1810. He refused to agree to Napoleon's demand that he should pledge himself not to take up arms against France, saying that from that time the interests of Sweden were his. It was not, however, until French troops invaded Sweden that he attacked Napoleon. When Napoleon declared war against Russia, Bernadotte held in his hands the destiny of Europe, Napoleon offering him large territories if he would attack Russia. He, however, joined the allies, but halted when France was invaded, before reaching the border, determined not to attack his native land. In 1814 he forced Denmark to cede to him Norway, which until June 7, 1905, remained joined to Sweden. In 1818 he became king of Sweden and Norway under the name of Charles XIV. Throughout his long reign of twenty-six years, though knowing nothing of the languages of his subjects, he ruled successfully and built up the country in many ways. He died at Stockholm, March 8, 1844.

Bernard (*bĕr-närd'*), **Great Saint,** a mountain pass of the Alps, between the Swiss canton of Vaud and the valley of Aosta. At the highest point of the pass, nearly 8,000 feet above the sea, near the line of perpetual snow, is the monastery or hospice of St. Bernard. It is said to have been founded in 962, for the succor of travelers crossing the mountains. The celebrated St. Bernard dogs are trained to assist in this work. By this pass, Roman armies, armies under Charlemagne and Frederick Barbarossa and Napoleon's army of 30,000, with artillery and cavalry, crossed the Alps. The Little St. Bernard is a mountain 7,200 feet in height, south of Mont Blanc. It has a pass by which Hannibal is thought to have crossed into Italy.

Bernardino de Betto Bagio. See PINTURICCHIO.

Bernhardt (*bĕrn'härt*), **Rosine** (called Sarah), a famous French actress, was born in Paris in 1844. Her parents were Jews, but she was brought up in a convent at Versailles. She made her first appearance on the stage in 1862, at the Théâtre Française, but at first attracted little notice. In 1867 her playing of the part of Marie de Neuberg in a play by Victor Hugo, called *Ruy Blas*, made her famous. She then went back to the Théâtre Française, in Paris, and after 1879 began to appear each year in London, where she was very successful. Her trips through America and Russia were also successes. In the United States her favorite rolês were those of Fédora and La Tosca, while she drew immense audiences when she appeared in Adrienne Lecouvreur and La Dame aux Camelias. She was probably the greatest actress of tragedy of her time. She died in Paris, March 27, 1923.



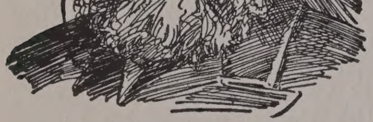
SARAH BERNHARDT

Bertill'on System, The, was made public by Dr. Alphonse Bertillon in 1885 in Paris, after he had been at work upon it for six years. The purpose of the system is to identify criminals. Its chief feature is accurate bodily measurement. After the age of twenty the skeleton is almost wholly fixed; and yet in no two individuals are the measurements of parts of the body liable to be closely alike. Precise descriptions, in which the color of the eyes is most important and also photographs are employed to assist the method of measurement. Marks, moles and scars are carefully noted, and their position is registered with great exactness. The system has now been adopted in most European countries. Its employment in the United States dates from 1887. It is very needful to identify criminals; and the Bertillon system makes innocent persons safe from the danger of being identified with some criminal who may resemble them. In Paris there is a collection of the measurements and descriptions of no less than 120,000 criminals; and it is likely that the United States will form a similar central collection, for it is said that European criminals flock to the United States because the Bertillon system is less universal in this country.

Beryl, a precious stone, a variety of emerald and known also as aquamarine. They are usually found embedded in granite or in veins that traverse granite or gneiss. Their color is sometimes yellowish and sometimes of a greenish-blue tinge. The best beryls come from Brazil, Ceylon and Siberia; the common opaque beryl is met with in this country. The difference between the beryl and the emerald is due to the coloring-matter; both are double silicates of alumina and glucina; in the beryl the coloring matter is oxide of iron, and in the emerald it is oxide of chromium.

Besancon (*be-zän′sôn′*), a French city, capital of the department of Doubs, lies on both sides of the River Doubs. The citadel is perched on an almost inaccessible rock, 410 feet above the river, and the city is so well fortified that it is considered one of the strongest places in France. In the days of Cæsar it was called Vesontio, and there he gained several victories. Some streets still bear old Roman names, and Roman ruins are to be seen in the neighborhood. The modern inhabitants are largely engaged in watch-making, the yearly product being nearly 450,000 watches. Victor Hugo and Abel Rémusat, the great scholars, were born at Besançon. The city was ceded by Spain to France in 1679, and was unsuccessfully beseiged by the Austrians in 1814. Population, 55,362.

Besant (*bĕz′ănt*), **Sir Walter,** English novelist, was born at Portsmouth in 1836, and educated at King's College, London, and Christ's College, Cambridge. In 1868 he published his first work, *Studies in Early French Poetry*, which was followed later by a work on the *French Humorists*. His career as a romance writer was in conjunction with a journalist, James Rice, in partnership with whom appeared *Ready Money Mortiboy* and many other novels. Of the stories that appeared in his own name the best are: *All Sorts and Conditions of Men*, *Children of Gibeon*, *All in a Garden Fair*, *Katherine Regina*, *For Faith and Freedom*, *Armorel of Lyonesse* and *The Orange Girl*. Sir Walter took great interest in matters that affect the interests and status of authors in respect of copyright; he was for many years secretary to the Palestine Exploration fund; and the People's Palace, in the East of London, was inspired by one of his stories. He was knighted for his services to literature in 1895. He died June 9, 1901.



WALTER BESANT

Bes′semer, Ala., a city in Jefferson County, in the center of an iron-producing region, on the Louisville & Nashville and other railroads, 11 miles southwest of Birmingham. Its industries embrace large iron and steel works, blast furnaces, foundries, rolling and planing mills, machine shops and fire brick works. There are coal as well as iron mines in the vicinity. Population, 20,000.

Bes′semer Process. See STEEL.

Bessemer, Sir Henry, an English inventor and engineer, was born in Hertfordshire in 1813, and died in London, March 14, 1898. He is famed for his many inventions, but especially for the revolution in the steel making trade, due to his cheap and ready process of making steel from pig-iron. The process increased the output of steel enormously both in this country and in England: in England the annual production at once rose from 50,000 to 3,000,000 tons, while the price fell nearly 80 per cent. The Bessemer invention consisted in taking the pig-iron when in a state of fusion and blowing a blast of air through it, to clear it of all carbon, and then adding the necessary carbon to produce well-tempered steel. He was knighted in 1879, and was the recipient of many honors and decorations. See KELLEY, WILLIAM.

Beth′any, meaning "the house of dates," lies on the southern slope of the Mount of Olives, in Palestine, 2,208 feet above the sea. This little village was the home of Lazarus and his sisters, and was often visited by Christ, and there He worked his greatest miracle. It was also the scene of His ascension. It is now a place of about 200 inhabitants. Houses said to be those of Martha and Mary and the cave where Lazarus was buried, are pointed out to the traveler.

Bethes′da, Pool of, meaning "house of mercy," or "house of the stream," is the tank or pool at Jerusalem associated with Christ's healing of the impotent man. The large reservoir, called "Birket Israel," near St. Stephen's gate, and the spring Gihon or En Rogel, in Kedron Valley, are each cited by different scholars as the place of this ancient pool.

Beth′lehem, meaning "house of bread," now called Beitlahm, known as the birthplace of Christ and of King David, is a small village six miles south of Jerusalem. The present inhabitants, numbering about 3,000, live by making and selling crucifixes, beads, boxes, shells and other articles of mother-of-pearl and of olive wood. The Convent of the Nativity is a large square building, believed to have been built by the Empress Helena, 327 A. D.; destroyed by the Moslems in 1236; and rebuilt by the crusaders. The Church of the Nativity within it is divided among the Latin, Greek and Armenian Christians, who make up the entire population. The church is in the form of a cross, the finest part being the nave, which is supported by forty-eight Corinthian columns of solid granite. At the head of the cross, a sculptured marble star marks the entrance to a long passage descending to the crypt or chamber, in which a silver star shows the spot where Christ is said to have been born. The star is engraved with the words, in Latin: "Here Jesus Christ was born of the Virgin Mary." The manger in which he was laid is in a recess cut in the rock.

Bethlehem, Pa., a borough in Northampton County, about 55 miles north of Philadelphia, with which the town of West Bethlehem was incorporated in 1904. Total population of the city is 65,000. It is situated on the Lehigh River and Canal, two bridges across which give access to South Bethlehem, the seat of Lehigh University. Bethlehem is reached by the Central Railroad of New Jersey, the Lehigh Valley and the Philadelphia & Reading railroads. Founded by Moravians in 1742, it early became a noted seat of the Brethren of that church and of their institutions, including the Moravian College and a Theological Seminary and Moravian Seminary a well-known school for girls. The town has a public library and a hospital (St. Luke's); it has also Bethlehem Steel Works, the largest steel manufacturing plant outside of the United States Steel Corporation, but it has other industries. The town, which was incorporated in 1845, received its charter in 1851, and it owns and operates its own water-works.

Bethmann-Hollweg (*bāt män hôl vĕg*), **Theobald Theodore von,** German jurist and statesman, imperial chancellor during the World War. Born in 1856, of a well-known wealthy family, he rose rapidly, becoming governor of Brandenburg province in 1899 and in 1905 Prussian minister of the interior. He was imperial chancellor 1909 to 1917.

Bethsaida (*bĕth-sā'ĭ-da*), meaning "house of fish," is the name of two villages on the Lake of Galilee. The one on the western shore was the birthplace of Peter, Andrew and Philip, the Apostles. A heap of grass-grown ruins is thought to mark its site. The other, at the northern end of the lake, lies adjacent to the scene of the feeding of the five thousand by Christ. It was afterward called Julias.

Beust (*fôn boist*), **Frederick Ferdinand von, Count,** a prominent modern German statesman, was born in Dresden in 1809. He devoted himself to politics, and was employed by his government in different services in Berlin, Paris and London. In 1849 he was made minister of foreign affairs He opposed Prussia, and after the battle of Sadowa, entered the service of Austria, where he was made chancellor in 1867. He completely reorganized the Austrian Empire, and the present constitution was his work. He was later an Austrian ambassador at London (1871–78), and acted in the same capacity at Paris (1878–82). He died October 24, 1886.

Bevan, Theodore F., F.R.G.S.A., the explorer, was born near London, October 14, 1860, and has largely given his life to the exploration of British New Guinea. In 1887 he discovered the Aird and the Purari Rivers there, the latter the next to the largest in the territory.

Bev'eridge, Albert Jeremiah (1862–), American senator, was born in Highland County, Ohio, and as a child was taken by his parents to Indiana where his younger years were spent in farm and railway construction work. He, however, snatched time to study in the winter months and subsequently entered De Pauw University, at Greencastle, Ind., from which he graduated in 1885. He later on became clerk in a law office in Indianapolis, where he was drawn to political life and took part in the Blaine campaign of that era, meanwhile going on with his law studies, and was admitted to the bar. During the nineties he became widely known in his state by his political speeches, and in 1899 was elected as a Republican senator from Indiana. In the latter year he visited the Philippines, and in the following year he addressed the senate in favor of the administration's policy of retaining the islands under such local government as the situation demanded. This was in January 10, 1900. Among his many speeches and addresses is one on "The March of the Flag," delivered at Indianapolis, Ind., September 16, 1898. By these speeches he has made a notable mark, while he is also known as an author by his work on *The Russian Advance* (1904) and by a booklet, issued in 1905, entitled *The Young Man and the World.*

Beverly, Mass., a city in Essex County, Mass., on an inlet of the Atlantic, 18 miles northeast of Boston, and on the line of the Boston & Maine (Eastern) Railroad. It has factories engaged in the manufacture of women's boots and shoes, and leather, the largest shoe machinery plant in the country and has considerable trade in fish. It possesses a good harbor and has a share in the coasting trade. Here is located the New England Institute for the Deaf and Dumb. Population, 28,000.

Beyrout (*bā'rōōt*) or **Beirut,** known to the ancients as Berytus, is a commercial city on the coast of Syria, 55 miles from Damascus and 147 from Jerusalem. It is the chief seaport and market town for all the trade on the shores of Syria and Palestine. British, French and Egyptian steamers maintain a regular service, carrying back wool, olive oil, gums and silk in exchange for their cargoes; and since the opening of the Suez Canal a direct eastern trade in spices, coffee, indigo and jute has sprung up. The first line of omnibuses in Syria was established here in 1859, and water works and gas works have been introduced by European companies. A Scottish school for Jews and the Protestant Syrian College have also been founded here. The American Presbyterian Mission in Syria has its headquarters here. Population, 150,000.

Bhutan or **Bhotan** (*bŏŏ-tän′*), an independent state, in the Eastern Himalayas, area about 16,800 square miles. It lies south of Tibet and north of Assam and Bengal, and is flanked in the west by Sikkim and Nepal. Its population is close upon 30,000, and its capital is Punakha, a place of much natural strength. It has a dual ruler, Deb Raja, the secular, and Dharin Raja, the spiritual, head of the state. Its trade is chiefly with British India, its main products being rice, Indian corn, millet, musk, chowries and silk. Formerly its native tribes were given to aggress on British India, but this was put a stop to, the Bhutan rulers receiving an annual subsidy from the Indian government conditional on the good behavior of the natives. The latter are nominally Buddhists, but their religious exercise consists chiefly in the propitiation of evil spirits and the recitation of verses from the Tibetan Scriptures. The principal monastery in Bhutan (Iasichozong), has 300 priests. The country has a varied climate and a wide range of products.

Bible. The word Bible comes from the Greek, where it is plural and means *the* books: books that stand apart from and in moral worth are higher than all other books. The Bible consists of two great parts, the Old and the New Testament—testament meaning covenant, a covenant between God and His people. The Jews had a threefold division of the Old Testament into the *Law*, the *Prophets*, and the *Sacred Writings.* By the *Law*, they meant the first five books, called usually the Books of Moses or the *Pentateuch.* Of course, law is not the only thing we find here. There is also history, from the story of the creation in *Genesis* to the death of Moses in *Deuteronomy.* But in this bed of history we find three sets of law or codes; the *Book of the Covenant* (Ex. xx-xxiii). which seems to have been followed by the Israelites till the reign of Josiah; *Deuteronomy*, which prevailed from the time of Josiah to the exile; and the *Priestly Code* (Leviticus), which came to be looked upon as authoritative after the Restoration.

The Jews divided the *Prophets* into the former prophets and the latter prophets. By the former prophets, they meant what we generally call the historical books, *Joshua, Judges, Samuel,* and *Kings.* which give us the sayings of the great prophet-statesmen, Samuel, Elijah, and Elisha, though they themselves wrote nothing. With the Israelites the sense of being a people and the sense of being a people of Jehovah were almost one and the same, and this is one reason why we find so much history in the Bible. So in the *Prophets*, as in the *Pentateuch*, we find history; Joshua to Kings being really one work, setting forth the fortunes of the people from the conquest of Canaan to the fall of Jerusalem.

The latter prophets are divided into the greater prophets, *Isaiah, Jeremiah, and Ezekiel;* and the minor prophets, the twelve smaller books. The prophets made predictions, but this was not all their work. They were sent usually to guide the people in great crises. Amos and Hosea came before the fall of Samaria, Isaiah during the great struggle with Assyria, and Jeremiah before the destruction of Jerusalem. The *Sacred Writings* include books of poetry—*Psalms, Proverbs, Ecclesiastes, Lamentations* and the *Song of Songs;* books of history—*Chronicles, Ruth, Esther, Ezra, Nehemiah,* and one prophet, *Daniel.* That the *Psalms* are true poetry no one will deny; yet there is no accent, or counting of syllables, no rhyme or rhythm. The one thing that makes the *Psalms* the finest religious poetry in the world is what is called parallelism; that is, an arrangement in couplets or pairs, the second line repeating or contrasting the thought of the first. There is much poetry outside of the poetical books, and the oldest piece of writing in the Bible is a song, that of Deborah (*Judges v*).

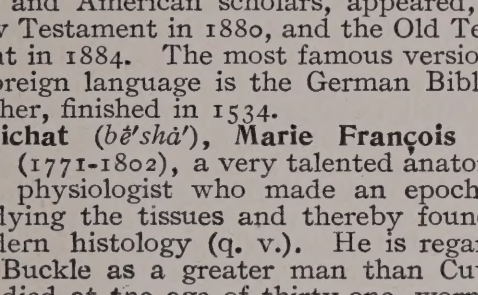
Running all through the Old Testament we find hints, passages, and whole discourses showing that Jehovah had promised the people a deliverer out of all their troubles, who was to be known as the *Messiah.* It is these Messianic prophecies, as they are called, more than anything else, that bind the Old Testament to the New Testament, which tells of a new covenant, through Christ the Messiah.

The New Testament begins with four accounts of Christ by his followers, called the Gospels The authors of the first and fourth, Matthew and John, were themselves disciples, while the other two gospels were written by Mark, a follower of Peter, and Luke a companion of Paul. The *Acts of the Apostles* tells of the planting of the church. Then follow twenty-one letters of the Apostles—personal letters, as the epistles to *Timothy*, and letters to the churches that sprang up as the Apostles went preaching from town to town and from country to country. Christ uttered prophecies, but the one prophetical book in the New Testament is the *Revelation* of St. John.

The Old Testament was written in Hebrew on skins, linen cloth, or papyrus and kept in rolls. The first draft of *Matthew* seems to have been in Hebrew, but was translated into Greek, in which language were written the other New Testament books, as the Greek tongue was read and understood throughout the Roman world. In modern times translations have been made into all spoken languages. The first English version was *Wiclif's Bible* (1382). Tindale's *New Testament* was the earliest printed version, and Miles Coverdale brought out the first complete English Bible in 1535. Other editions followed: the *Great Bible*, brought out through the efforts of the Protector Cromwell; the *Geneva Bible*, through the English refugees at Geneva in the reign of Mary; the *Bishop's Bible*, superintended by Archbishop Parker; the New Testament at Rheims, and the Old Testament at Douai, by the English Catholic College. The *King James* or *Authorized Version* appeared in 1611, the work of six committees of scholars. The *Revised Version*, the joint work of English and American scholars, appeared, the New Testament in 1880, and the Old Testament in 1884. The most famous version in a foreign language is the German Bible of Luther, finished in 1534.

Bichat (*bē'shȧ'*), **Marie François Xavier** (1771-1802), a very talented anatomist and physiologist who made an epoch by studying the tissues and thereby founding modern histology (q. v.). He is regarded by Buckle as a greater man than Cuvier. He died at the age of thirty-one, worn out by too severe application to study and research.

Bicycle (*bī'sĭ-kl*), a machine, as the name shows, for riding with two wheels, moved by pressing the feet on pedals. The first two-wheeled "cycle'' was called the "dandy horse," and was moved by kicking the feet, one after the other, into the ground, and then holding them up until the dandy horse stopped, when the process was repeated. The first practical bicycles were made in England in 1869, of wood and iron, and were fitly called "bone-shakers." The invention by an Englishman soon after of the rubber tire and steel frame made the modern bicycle. The old high-wheeled bicycle, with its tendency to "headers" was soon laid aside for the convenient "safety," which is now in most common use. The pneumatic tire, ball bearings, which greatly reduce friction, the evolution of the chainless wheel and other improvements, together with a large reduction in cost, made the bicycle a popular and expeditious means of travel and recreation for old and young of both sexes and all classes. "Cycling clubs" became popular and long tours were made with ease. While bicycling as a sport has largely died out, the wheel is still widely used as a practical and convenient means of locomotion.



BICYCLE

Biddeford, Me., a town in York County, Me., on the Saco River, and opposite Saco Falls, six miles from the Atlantic and 15 miles southwest of Portland. The town was settled early in the 17th century, was incorporated in 1718, and became a city in 1855. The city has excellent water power, and as a result is a manufacturing center. Among the leading products are lumber, boots, shoes, machinery and also the extensive manufacturing of cotton cloth and leather tanning. The vicinity of the city is rich in good granite, and the export of this fine building stone adds considerably to the industrial wealth of its people. Biddeford has an excellent school system and a high school building erected at a cost of $50,000, a fine public library and daily, weekly and monthly papers. Population, 20,000.

Bien'nials, plants which endure through two growing seasons. See DURATION.

Bienville (*byăn'vēl'*), **Jean Baptiste, Sieur de,** French governor of Louisiana, was born in Montreal, Canada, in 1680, and died in France in 1768. With his brother, Iberville and a few settlers from old and new France, Bienville erected a fort in 1699 at the mouth of the Mississippi, and was for many years director of the colony, and subsequently governor of Louisiana. Quarreling with La Salle, the royal commissioner, Bienville was for a time deposed from office and recalled to France; but was afterward reinstated. When Law's Mississippi company was formed, Bienville moved his headquarters to New Orleans in 1718, and founded the town. Later on, having undertaken unsuccessful expeditions against the Chickasaw Indians, he was removed from the governorship, and in 1743 returned to France. He published the *code noir* (black code), which remained in force in the colony until Louisiana was purchased by the United States. The code was rather vigorous in its provisions, as not only did it regulate the condition of the slaves, but banished Jews from the colony, and banned every religion save that of the Roman Catholic Church.

Bierstadt (*bēr'stät*), **Albert,** an eminent American artist, was born near Düsseldorf, Germany, in 1830. His parents emigrated to the United States when he was two years old, but he returned when older and spent several years in study in his native city. In 1858 he visited the Rocky Mountains, and the first result of his visit was his sketch of *Lander's Peak*.

which attracted special notice in the Paris exposition of 1867. Upon this picture and upon his other landscapes his fame mainly rests. Other works are the *Domes of the Yosemite*, *Laramie Peak*, *Emigrants Crossing the Plains*, *Mt. Hood* and *Mt. Whitney.* In 1873 he visited the Pacific Coast and painted a series of pictures of that region. His house and studio at Irvington, N. Y., were burned in 1882. Fortunately some of his best pictures were on exhibition in New York city at the time and so were saved. He was a member of the Academy of Fine Arts at St. Petersburg. His death occurred in 1902.

Big Black River, a river of Mississippi, is about 200 miles long and flows into the Mississippi. It is navigable for boats for fifty miles, and is bordered by rich cotton plantations for most of its length.

Big Horn River, the largest branch of the Yellowstone, rises in the Rocky Mountains in the northwest part of Wyoming, where it is called the Wind River. It enters the Yellowstone at Big Horn city, in Montana, and is about 350 miles in length.

Big Sandy River flows into the Ohio and forms the boundary between Kentucky and West Virginia. Steamboats navigate it for a hundred miles. The timber and coal along its valley are very valuable.

Bigelow (*big'e-lō*), **John,** American journalist and author, was born at Malden, N. Y., November 25, 1817. He graduated at Union College in 1835, and for a time practiced law, but afterward deserted it for journalism. In the fifties he was one of the editors of the New York *Evening Post,* and in the following decade was consul, and subsequently (1864–67) United States minister to France. In 1875–77 he was secretary of the state of New York. His writings include *Lives of Frémont* and *Wm. Cullen Bryant; France and Hereditary Monarchy;* and a History (in French) of *The United States of America in* 1863. He also edited *Franklin's Autobiography and His Works* and the *Speeches of Samuel J. Tilden.* He died Dec. 19, 1911.

Billiards, an indoor pastime of great popularity, calling for the exercise in playing the game not only of a quick eye but also of a steady hand and delicate touch, besides good judgment in estimating the strength of stroke necessary to good billiard playing, in addition to proficiency in the use of the cue, with which the game is played, and correctness and accuracy of aim. Not much definitely is known of the origin of the game, though it would appear to have been played in many parts of Europe during the Middle Ages, in the 15th century in France, and later on in England. About the year 1565 it would seem to have been introduced on this continent by Spaniards residing in Florida. The game is played with two white balls propelled by ivory-tipped cues or staffs usually well-chalked, in the hands of the players, on an oblong rectangular table, with a cloth or baize covering over its slate bed, the table having vulcanized cushions round its inner sides, so that the balls when they strike the sides may rebound from it in the player's design to strike not only his opponent's white ball, but the red ball placed in position on a small black spot at the head of the table bed, and in the center of it. The players may be two or more in number on each side. In Great Britain the tables are generally furnished with six pockets at the four corners and on either side, the players commonly using four balls; while in France and in this country the game is played with three balls, and on a table without pockets. The balls, which are of ivory 2⅜ inches in diameter, are propelled by a cue, made of maple or ash wood 4½ to 5 feet in length, the diameter at the butt end averaging 1½ inches tapering to a point at the delivery end of from ⅝ths to a ¼-inch in diameter. Balk-lines are frequently marked on the billiard table, in championship games 14 and sometimes 18 inches from the sides and top and bottom, to give increased interest to the matches and calling for higher skill in playing games. In playing the game the lead off is determined by what is called banking. The several players take their stand at the foot of the table, and each strikes his ball in turn with such force as to send it to the head or far end of the table and back again, the player whose ball lands nearest the foot or near cushion being declared winner. The game is begun by placing the red ball on the marked spot at the head of the table, while the white ball of the player who has lost the bank is placed on the spot at the near end. In opening the game the player must strike his opponent's white ball before striking any other with his own ball. A shot is made when the player strikes his ball so that it shall hit the two object balls; and he continues to play until he fails in this, when it is his opponent's turn to play. For other details of the game, see any good work on billiards; also, see the important contemporary almanacs of the year for records of notable matches and championship tournaments.

Billings, Montana, a city, the county seat of Yellowstone County, on the Yellowstone River, about 236 miles east by south of Helena, and reached by the Northern Pacific, Great Northern and Chicago, Burlington & Quincy. It is the center of a large live stock, sheep raising and agricultural region, having considerable trade in the shipment of live stock and an extensive export of wool. In its neighborhood are important mineral deposits, chiefly of coal, limestone and marble. Among its public buildings, besides a city hall and court house, are a public library and an opera house. Population, 15,000.

Bill of Rights. This name is commonly given to the declarations of the rights of citizens which are prefixed to the constitutions of most of the states of the Union. It is also given to the first ten amendments to the U. S. constitution, proposed by the first constitutional congress and adopted in 1791 by the states. The original bill of rights was, however, an English act of Parliament which summed up the results of the revolution which had placed William and Mary on the throne. This bill of 1689 made it illegal for the crown to suspend the laws, levy money without the consent of parliament, or keep a standing army in time of peace. It also declared the rights of citizens to impartial and not over-severe justice, frequent parliaments, carrying arms for self-defense, free elections and petition to the king. To this bill of rights was added an act for the settlement of the crown upon William and Mary and their children; and next upon Anne and her children.

Bimet'allism. The system of money which admits both gold and silver to coinage at a fixed relative value, and which regards them as having the same legal-tender value is called *Bimetallism*. Up to the time of the Civil War, the bimetallic system was the legal system in the United States. In 1873 the gold standard was recognized by law. Silver coins are used, but are not coined upon the same terms as gold, and not all of them have the same legal-tender value as gold, hence the system is not bimetallic. It is claimed by the adherents of bimetallism that if a definite ratio of value were established by law between gold and silver that (1) the exchanges between nations would be simplified, and (2) that the price of commodities would fluctuate less, since the fluctuations in the prices of the latter are, so it is claimed, associated with the fluctuations in the value of silver. The question of bimetallism was the great issue in the presidential campaign of 1896, and the candidate who advocated that theory was defeated. Since that time discoveries of gold in great quantities have relieved the financial situation to such an extent that a change in the money standard is not urged with the same earnestness as formerly.

Bingen (*bĭng'en*), a picturesque old town of Germany, on the Rhine, in the grand duchy of Hesse-Darmstadt. Population of the commune, 8,187. Neighboring mountains, crowned with ruins, and an old bridge, dating back to the era of the Romans, increase the beauty of the place. Below the town is the famous Bingerloch or Bingen Hole, where the Rhine narrows into a strait between towering rocks. Above them, rises the Maüsethurm or Mouse-tower in the middle of the river, where, in the 10th century, Bishop Hatto, of Metz, collected toll from all passing vessels, and where he himself was finally eaten alive by mice attracted to the tower by the grain he had stored away in a time of famine. In popular legend it was near Bingen that the treasure of King Nibelung, which gave its name to the Nibelungen-Lied, was sunk in the Rhine.

Bing'hamton, the county seat of Broome County, N. Y., lies on both sides of the Susquehanna River, at the mouth of the Chenango River, and both rivers are spanned by several bridges. It is an important railroad town, and has more than 300 manufacturing establishments, the leading ones being furniture, glass, gloves, scales, leather, boots, shoes and cigars. It takes third rank in the U. S. n the last named industry. Among its noted buildings are the U. S. government building, the state armory, the state insane asylum, two orphan asylums, etc. The use of anthracite coal has kept the city clean and free from smoke, earning it the title of the parlor city. Population 75,000.

Biology, a subject of great interest and importance, not only to scholars and medical men, but to all intelligent people who care for living nature. All questions in regard to the living world belong here. An animal or plant is wonderfully constructed, but, after all, the most wonderful thing about it is that it is endowed with life. While it is interesting to observe the structure of animals and plants, it is even more interesting to learn the purpose of the structure and to determine what is taking place within their bodies, what has been their past history, how they behave in reference to their surroundings, etc. This is, of course, very difficult; it requires observations with and without the microscope, experiments, and the use of the best powers of the mind.

Biology is an attempt to analyze the activities of life and finally, if possible, to give an explanation of the same. It is one of the natural sciences and is related to many branches of learning. It is easily separated from physics and chemistry, both of which deal with lifeless matter, but is is closely connected with natural history, medicine, physiology, botany, zoölogy, psychology and with many affairs of every-day life.

Biology in its modern sense is of recent origin. It is customary to consider it as having taken rise about 1860, but in order to understand the reason for this way of looking at the matter, it will be necessary to trace the growth of the subject. It is a long story, reaching over several centuries, but it can be briefly told.

Among the ancient Greeks observations directly upon animals and plants led to many facts of natural history. Aristotle (384-322 B. C.) is the best representative of the knowledge of his time about life. But after a few centuries the mind of mankind was turned away from nature. In due course of time, there was a complete arrest of inquiry into all things relating to the external world.

During this period, other branches of learning might make a little advance, but the knowledge of nature suffered the most, because we cannot know anything about natural phenomena without turning the mind outward and making direct observations upon the external world. Therefore, it was an epoch of great importance when men began again to observe, to use their eyes, and to turn to the great world of nature outside themselves. The men who started independent observations deserve much credit, for the authorities of both church and state were unfriendly to unbiased inquiry, and they went against every motive of self-interest in becoming pioneers in the new intellectual life. Vesalius (see ANATOMY), Galileo and Descartes were among the reformers in the 16th century, and in the 17th century the work of Malpighi, Swammerdam and Leeuwenhoek is worthy of especial mention. Their great work consisted chiefly in this, that "they broke away from the thraldom of book-learning, and, relying alone upon their own eyes and their own judgment, won for man that which had been quite lost, the blessing of independent and unbiased observation."

Thus awoke again the good spirit of inquiry and thereby the foundations of modern science were laid. When attention was turned to animals and plants, the first things noticed were, of course, the simplest and most obvious: external form, color, habits. This is the period in which the organism was studied as a whole, for each plant and animal is an organism. The naturalist of the time knew relatively little about the internal structure of animals and plants but many general facts about them. Linnæus and Ray represent this level of knowledge. For them, the study of nature consisted in observing and collecting widely, grouping or classifying animals and plants, learning about their habits, etc. Linnæus made an epoch by introducing a method of naming plants and animals by giving to each two names—a generic and a specific name. This made knowledge more definite. He used Latin, which was the language of science, and, as his method was universally adopted, the same name came to apply to the same animal or plant in all countries. This directed the attention of naturalists to species or particular kinds, and thereby prepared the way for the discussion of the origin of species, which is the fundamental question in the doctrine of organic evolution.

But another advance was to come. The next natural step after the study of the organism as a whole was to think of its architecture or the way in which it is constructed. Men began, therefore, to observe the organs or parts that are united together to make up animals and plants. This was a study of internal structure. The construction of animals was studied very widely and they were compared with one another, so that there arose the new science of comparative anatomy (see ANATOMY) of which Georges Cuvier (1769-1832) was the founder. Similar work was done for plants by Jussieu. But knowledge of nature was becoming so much extended that it was necessarily subdivided, and investigations into the uses of the organs were being made by physiologists like Haller and J. Müller (see PHYSIOLOGY) at the same time that structure was being studied by the anatomists.

The next step was based on the observation that organs are composed of simpler parts called tissues. Often several different kinds of tissue will unite into one organ; for example, the heart is not all muscle but connective tissue and nerves enter into it; the walls of the stomach also contain glands, muscles, nerves, connective tissue, etc., all united to form the one organ—the stomach. The leaf of a plant is not all one kind of tissue, but several different kinds enter into it. We are thus approaching step by step the finer structure of living beings. Bichat (1771-1802) studied the tissues extensively, and at the beginning of the 19th century laid the foundation of microscopic anatomy or histology.

The next step was based upon the perfection of the microscope. This instrument had been introduced, in a crude form, into natural history in the 17th century, and had opened a new world to naturalists. About 1840 great improvements were made in manufacturing the magnifying glasses for the microscope, and observers began gradually to see that the tissues are not the simplest parts of animals and plants, but that tissues are composed of very small units or particles, brought together and built into the tissues as bricks might be fitted together into a building. This idea took definite form about 1839–40, principally through the observations of two men, Schleiden and Schwann. The former was a botanist, and he came to the conclusion that all the parts of plants are built of little box-like compartments or cells. The latter, his friend, was an anatomist and zoölogist, who, from his studies with the microscope on animals, reached similar conclusions. This great discovery unites all animals and plants on a broad plane of similitude of structure. It is known as the cell theory, and has done much toward unifying the knowledge of animals and plants. This, taken in connection with the fact that all animals and plants arise from a single cell, has great meaning. The discovery that the egg of all animals is a single cell, shows that the starting-point is one of the single bricks of organic architecture, which by successive divisions gives rise to all the others that enter into the construction. Plants also proceed from a single cell. These are among the most remarkable facts in all nature. In its original form, however, the cell theory was very imperfect. Both Schleiden and Schwann supposed that the cell wall was important, and looked upon the cells as little box-like compartments. This had to be changed by later students, and the cell theory was reformed and modified into the protoplasm theory.

The progress, thus far, had brought out the facts that cells are joined to make tissues, the tissues to make organs, and organs to make the organism, but there was one further step to be taken to bring this line of advance to its proper goal. It was soon discovered that the cell wall of cells is not important, but that the jelly-like viscid fluid within is the substance that is actually alive. This substance is the seat of all life and is called protoplasm (see PROTOPLASM). We see that observations began on the outside and led by a series of steps to the true seat of life, just as a flight of stairs uncovered by some good genii in the old fairy tales, led from the surface to a treasure cavern, but it took a good many years for naturalists to take each step. Max Schultze, in 1860, placed the ideas about protoplasm on a firm basis, and from that time dates modern biology, which is all about this living substance—what it is like in its various manifestations, what it is doing, and what it has done in the world.

Therefore, a great deal of the work of the biologist is the study of this living substance at first hands. He can place under his microscope the simplest plants and animals, and if they are translucent enough to let the light through, he can see many things that are taking place within the protoplasm. One of the common organisms of great interest to biologists is the amœba—a simple microscopic particle of living jelly in which the processes of life are reduced to their simplest expression, and it meets all the requirements for observation. This organism is really an animal and a single cell, and, therefore, it lies near the bottom of the animal series.

By suitable experiment and observation it can be shown that the amœba, simple as it appears, is really very complex. on account of the powers and activities which it exhibits by virtue of being alive. A list or catalogue of its activities will be the same as those occurring in the various tissues and organs of higher animals. Therefore, we have in it the germ of all the activities of the higher creation. Its body is a little mass of protoplasm, and anything determined about it holds good for protoplasm. This substance is the only one in the world that is endowed with life, and biologists have come to the conclusion that it is practically identical in plants and animals, but at the same time exhibits a wide range of variations and differences, not in kind, but depending on the degree of perfection and specialization.

Protoplasm has properties which, taken together, distinguish it absolutely from every form of non-living matter. These are: (1) its chemical composition; (2) its power of waste and repair and of growth; (3) its power of reproduction. Other substances are simpler in composition than protoplasm, in fact, it is the most complex substance in the universe. Common chemical elements like carbon, hydrogen, oxygen, nitrogen, sulphur and phosphorus, enter into it, but they are combined in a very much more complex manner than in any other substance, and they are all present at the same time. Living matter is also continually undergoing a process of breaking down, by a sort of internal combustion, and making good the loss by the manufacture of new protoplasm out of the simpler food particles. It also has the power of growth, and "lastly, living matter not only thus repairs its own waste, but also gives rise, by reproduction, to new masses of living matter; which, becoming detached from the parent mass, enter forthwith upon an independent existence."

"We may perceive how extraordinary these properties are by supposing a locomotive engine to possess like powers: to carry on a process of self-repair in order to compensate for wear; to grow and increase in size, detaching from itself at intervals pieces of brass or iron endowed with the power of growing up step by step into other locomotives capable of running themselves, and of reproducing new locomotives in their turn. Precisely these things are done by every living thing, and nothing like them takes place in the lifeless world." —Sedgwick and Wilson, *General Biology*.

The higher animals, all of which are many-celled may be looked upon as combinations of amœba-like elements, variously modified and built into the tissues. In passing from the condition of a single cell to that of many there has been not only an increase in the number of cells, but there has been also a physiological division of labor, so that particular groups of cells have been set apart to perform a certain particular round of duties, while other cells have been set aside for other work. For example, the protoplasm of certain cells has become very contractile and forms the muscles; in certain other cells the protoplasm has become highly irritable and responsive, and makes the nervous tissues; and so on for the other groups. This physiological division of labor has led to the different tissues.

Plants show very nicely the gradations between the single-celled and the many-celled condition. There are first linear aggregates, in which the cells are united end to end in a single row. The next step is groups of cells arranged in a single layer to form an expanded surface; and finally the combination of cells into a solid mass having length, breadth and thickness.

In biology, animals and plants are considered from a variety of view-points: as to their *Structure*, or the way in which they are constructed (see ANATOMY); as to their *Development*, or the stages through which they pass from the egg or seed to the adult (see DEVELOPMENT); as to their *Physiology*, or the uses of the different organs and the changes that are taking place in the protoplasm of the tissues; as to their *Distribution*. Biology is, therefore, a complex science, and is the result of the concurrent progress in all these departments. It may be likened to a great stream into which a number of smaller streams have united to make the main one, and it contains mixed together the product of all.

The main divisions of biology are, of course, greatly subdivided; for example, under structure, we might consider animals and plants in reference to their surroundings, and show that the structural peculiarities are the result of responses to the surrounding conditions, and we might further show how likeness in structure indicates relationship, and is the basis upon which animals and plants are classified or arranged into systematic groups. Moreover, development and physiology are very extensive branches, and must be divided into smaller topics for practical consideration. In reference to the distribution of animals and plants, it must be said that it takes two directions: first, their geographical distribution, and, secondly, their distribution in time. The first will be clear without further statement, but the second requires a word. We know that there are entombed in the rocks countless numbers of animals and plants that lived centuries ago and became extinct. The succession of life in the rocks is very interesting, beginning as it does with the lowest forms, in the earliest formed rocks, and passing to the higher ones in the later formed rocks. In this succession of stages we can read the past history of life on the earth, and this has helped greatly in establishing the doctrine of organic evolution.

It is an indefinite line that separates biology from botany and zoölogy. Modern botany and zoölogy embrace all that is known about plants and animals respectively, but the plant kingdom and the animal kingdom are considered separately. In biology the facts are approached from a different standpoint, and the emphasis is differently placed. The phenomena of life are brought into union in both animals and plants, and the attention is especially directed to the activities of protoplasm, and its responses to surrounding conditions. General biology is a term in common use to indicate the consideration of certain general facts about animals and plants. It is recognized as a distinct branch, and frequently studies of these general topics are made to precede studies that are mainly botanical on the one hand, or mainly zoölogical on the other.

These facts should make clear how the department of biology arose and what it is about; but before leaving the subject we should at least glance at its 19th century features. The three things that most distinctly mark biological advance during the 19th century are: (1) The cell-doctrine (which see),—the discovery of the fact that, with the exception of unicellular forms, plants and animals are composed of groups of cells, and moreover, that they all begin their existence as eggs or ovules, in the single-cell condition. (2) The discovery of protoplasm (which see), and the recognition of the rôle it everywhere plays in animal and plant life. (3) The doctrine of organic evolution, or the discovery of the genealogy of animals and plants.

There are in addition other things to be mentioned: The great extension of knowledge in reference to microbes and bacteria (which see) has been characteristic. Advances in this direction have led to the discovery of the nature of fermentation, of decay, to the germ theory of disease, etc.; and have also brought in their train an unusual number of practical applications: antiseptic surgery, the canning of fruits and meats, infecting insects with disease to stop the ravages of the injurious kinds; and also the protection of silk-worm culture, etc.

The growth of information regarding the development of animals and plants has been very great, and has been turned to account in reading the past history of life.

The question of the spontaneous origin of life was revived in 1858. That is the belief that the simplest microscopic forms of life are sometimes formed, spontaneously, from lifeless matter. But it was again answered in the negative, as it had been in the 18th century, and finally it was put to rest through the work of Pasteur, Tyndall and others.

In the latter part of the century experiments on living forms became prominent. The eggs, the larvæ and the older stages have been placed under different conditions of temperature, light, food, chemical and mechanical surroundings, and the effect of these changes watched. Many important facts have been brought to light by these experiments.

Biology is a body of rapidly expanding knowledge of intense interest and great service to mankind. Much was accomplished by it in the 19th century, but much more is to be expected in the 20th century.

For books about biology, see Sedgwick and Wilson's *General Biology*, Parker's *Elementary Biology* and Thompson's *The Science of Life*. Additional titles will be found under ANATOMY, BOTANY, ZOÖLOGY.

WM. A. LOCY.

Birch, species of the genus *Betula*, which consists of trees or shrubs, very widely distributed throughout the north temperate regions. The birches have usually a bark which separates in thin papery plates, and the long and pendulous catkins of flowers appearing in very early spring are well known. They grow in North America, Europe, North and Central Asia. Bailey states that no tree grows farther north than the birch. The Dwarf Birch is highly valued by the Laplander, furnishing him most of his fuel, and its tiny nut furnishing food for that bird so useful to the Laplander, the ptarmigan. The wood of many birches is inferior owing to the toughness of the bark interfering with the evaporation of the sap, its consequent fermentation and the crumbling of the wood. It makes excellent fuel; is used in manufacture, and is employed for furniture and small, common articles. Of the bark are made baskets, boxes, and that of the Paper Birch is extensively used for canoes; a dye is also made of it, and an oil which is used in the preparation of Russia leather. A number of birches are cultivated as ornamental trees, the weeping birch being extensively planted in this country. They are graceful of form, fair appearing from bark to least tremulous leaf. They are easily propagated by seeds and grow rapidly.

The American White Birch has a short life, but is a graceful tree and plucky one, springing up in deforested land and abandoned fields. It grows south as far as Pennsylvania. It is a small tree, from 25 to 45 feet high, the bark smooth and white, not readily peeling; foliage tremulous; dark green, triangular leaves, turning yellow in autumn. Recently the wood has come into value, found useful as wood pulp, for shoe-pegs and spools.

The Canoe Birch or Paper Birch is one of the largest and most picturesque of the birches, and is widely distributed throughout our northern states. It usually grows to a height of from 60 to 80 feet, sometimes reaches to 120 feet; its bark a conspicuous chalky white, which tears off readily in horizontal sheets. The leaves are large and broadly ovate. This, as the name suggests, is the tree so friendly to the Indians, giving them bark for their famous canoes, for their shelters, and for their household utensils, giving them fuel that quickly crackled and flamed; even giving them food, they making this use of the layer between wood and bark (cambium).

"And the tree with all its branches
Rustled in the breeze of morning,
Saying with a sigh of patience:
'Take my cloak, O Hiawatha!'"

The Indians to-day still make canoes of birch bark, baskets and various other articles thereof. The bark, as is well known, tears off in thin sheets of several layers, the thinner ones being frequently used as letter paper, a use of birch bark going back to ancient times. The peeling of the bark by careless hands, cutting too deep, results in the loss of many goodly trees, whose far-gleaming white columns have proved their undoing.

The Cherry Birch is a comely and useful tree also known as Sweet Birch and as Black Birch. It grows from 50 to 80 feet high, and is noted for its grace. The bark is dark brown, the leaves, from two to five inches long, are oblongovate. Early in the spring the Black Birch is all aglow with yellow catkins, is golden in the fall, and in the summer bears an abundance of glossy foliage. In the spring the wintergreen flavor of the saplings is very pleasant. The sap is made into birch beer, and from the inner bark are obtained salicylic acid and wintergreen oil. The hard, strong wood, of good red-brown color, is used for furniture, and for wheel hubs and fuel. The range of the tree is from Newfoundland to Ontario, south to Florida, Tennessee and Kansas. Other varieties are the Yellow or Gray Birch and the Red or River Birch. See Bailey: *Cyclopaedia of American Horticulture* and *The Tree Book* by Julia E. Rogers.

Bird Day, a day set apart for the purpose of interesting boys and girls in wild birds and in bird protection. The idea of Bird Day originated with Professor C. A. Babcock of Oil City, Pa., in 1894. Bird day was observed in Oil City in 1895. In some states Arbor and Bird Day are observed as a single festival.

Bird Protection, nature lovers had long been working for federal protection of birds, but the first distinct bird reservation was made in 1903 at Pelican Island, Fla. Since then many others have been added and a national law passed for the protection of migratory birds. In 1916 a treaty with Canada brought the hunting season and protection afforded in the two countries into agreement.

Birds, a natural class of vertebrates. Other groups of equal value are Fishes, Amphibia, Reptilia and Mammals, each of which is called a class. Birds are distinguished from all other animals in that they possess feathers. They moult or change the feathers once a year. They are warm-blooded animals with a four-chambered heart; their lungs are connected with air-sacs, and the bones are often hollow with spaces which are connected with the air-sacs, to make them light for flight. Living birds have no teeth, but many fossil birds had teeth. The birds as a group are closely related to reptiles. There were, in geological times flying reptiles, and there is a bird (*Archaeopteryx*) found in the rocks of Bavaria that forms a connecting link between birds and reptiles. The largest living birds are the ostriches, but the great fossil birds (*Dinornis*) of New Zealand were from six to ten feet in height. There are several other extinct birds of very large size. In the world to-day there are between 13,000 and 14,000 species.

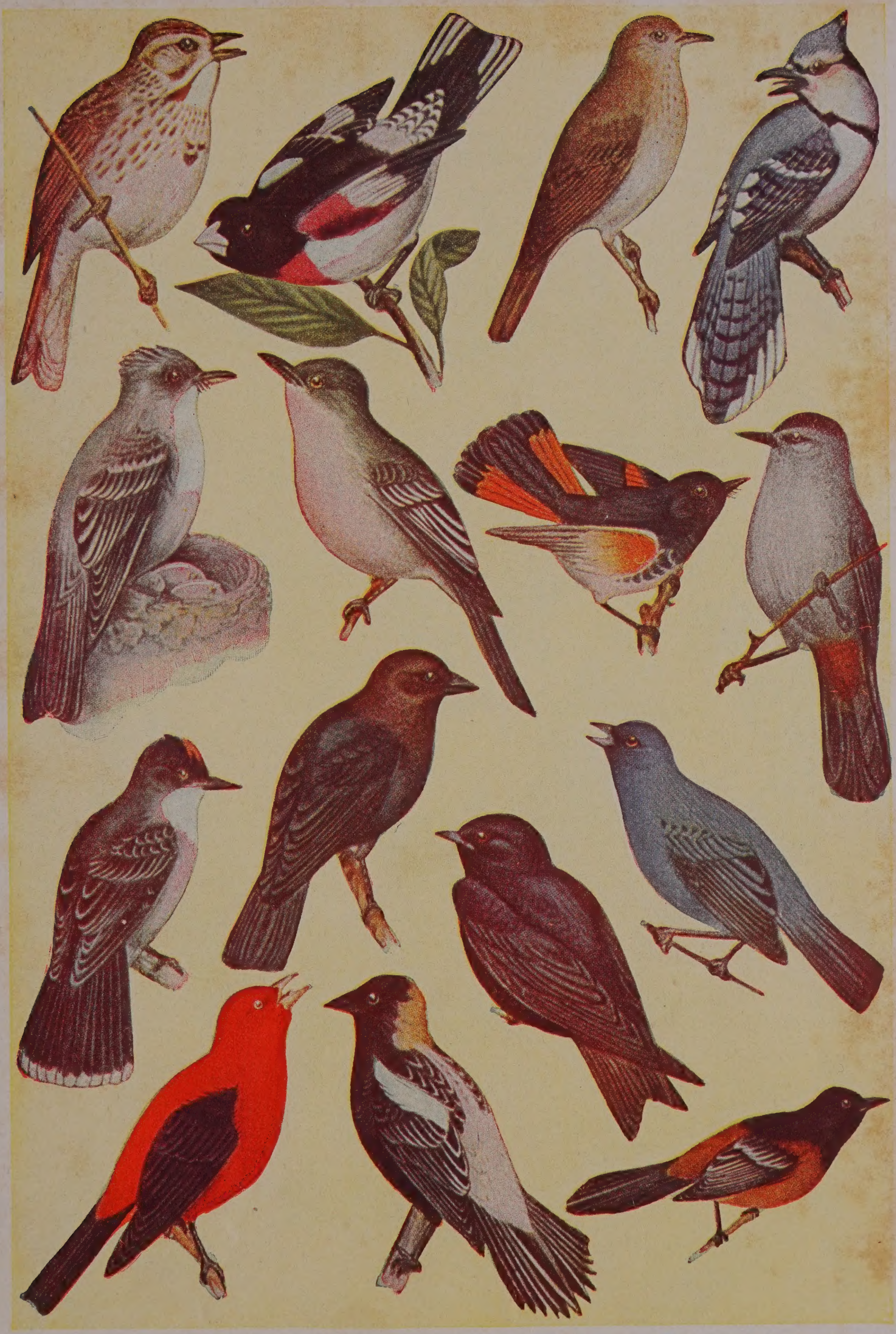
The best way to observe our common birds is with the help of opera-glasses. We should go into the fields and woods armed with opera-glasses instead of a gun. Quietly reclining under the trees, we may, with field-glasses, bring the birds near enough to see their colors and observe many of their habits. Besides their beauty, birds are highly useful, destroying numberless insects and acting as agents in cross fertilization and seed planting. A good book to help is Chapman's *Color Key to North American Birds*.

The modern classification of birds includes the extinct forms, and is too technical to give here, but the following arrangement may be found convenient: Our common birds are either (a) water birds or (b) land birds. The water birds include divers, swimmers, waders, and the shore birds, represented by loons, gulls, ducks, geese, swans, auks and pelicans, herons, storks, ibises, cranes, rails and snipes, sandpipers, woodcocks, plovers and killdeer.

The land birds are more numerous. Here the largest order is that of the perching birds, embracing many families and representatives, including most of the song birds. Flycatchers, kingbird, phœbe, larks, crows, jays, blackbirds, oriole, bobolink, meadow lark, cowbird, sparrows and finches, song sparrow, field sparrow, goldfinch, purple finch, rose-breasted grosbeak, swallows, waxwings, warblers, threshers wren, catkird, mockingbird, red thrush, creepers, nuthatch; the thrush family, blue bird, robin, hermit thrush, etc. Other families and representatives of the land birds are the scratchers: common fowl, turkey, pheasant, grouse, pigeons and doves; birds of prey: turkey buzzard, hawk, eagle, owl, cuckoos, kingfishers, wood-peckers, goatsuckers nighthawks, whip-poor-wills, swifts and humming birds. In addition to the above are the running birds; ostriches, emus, cassowaries.

See Chapman: *Bird-Life* (1899) and *Bird Studies with Camera* (1901); Davie: *Nests and Eggs of N. A. Birds* (5th ed., 1898); Coues: *Key to North American Birds;* Blanchan: *Birds Every Child Should Know; How to Attract the Birds* (1902); *Bird Neighbors* (1897); *Birds that Hunt and are Hunted* (1898); Dugmore: *Bird Homes* (1900); Merriam: *Birds of Village and Field* (1898).

Birds' Nests are primarily for rearing the young rather than for shelter. They show a great difference in architecture, from the most rude to the very complex, and birds may be divided into groups according to the way in which their nests are built. The mining birds either dig holes in the ground for their nests or use holes already dug by other animals. Thus the kingfisher digs a crooked gallery several feet into a bank and lays its eggs in a round hole at the end. Other birds of similar habits are the common bank swallow, the bee-eaters and the family of storm petrels. The wood-wren and the burrowing owl make their nests in ready-made burrows. Among ground-builders some build no nest at all, others only occasionally. The nighthawks lay their eggs on bare ground, as a large number of sea birds do on the sand. The brush turkeys of Australia, called mound builders, gather a large heap of decaying leaves and grass, and when the heap has become warm from rotting, dig a hole about two feet deep in the top, and lay their eggs, leaving them to hatch out by the heat. Vultures and common fowls belong to this group. The masons build their nests with walls or sometimes only coverings of mud. The cliff swallows build flask-shaped nests against the sides of rocks or cliffs. Several birds usually work at one nest, bringing mud, while one of their number directs the work from within. The baker bird of South America is the most skillful of this class. It builds its nests very high, in the shape of a baker's oven, with an entrance on the side twice as high as it is long, and the interior divided into two chambers by a partition. The common robin is allied to this group. The carpenters bore holes for their nests in trees. The woodpeckers, for example, dig with their beaks a short tunnel upward and then a larger hole downward, in the middle of the tree, where the eggs are laid. The platform builders include the eagle and pigeon. The level platforms of branches of trees and sticks built by eagles



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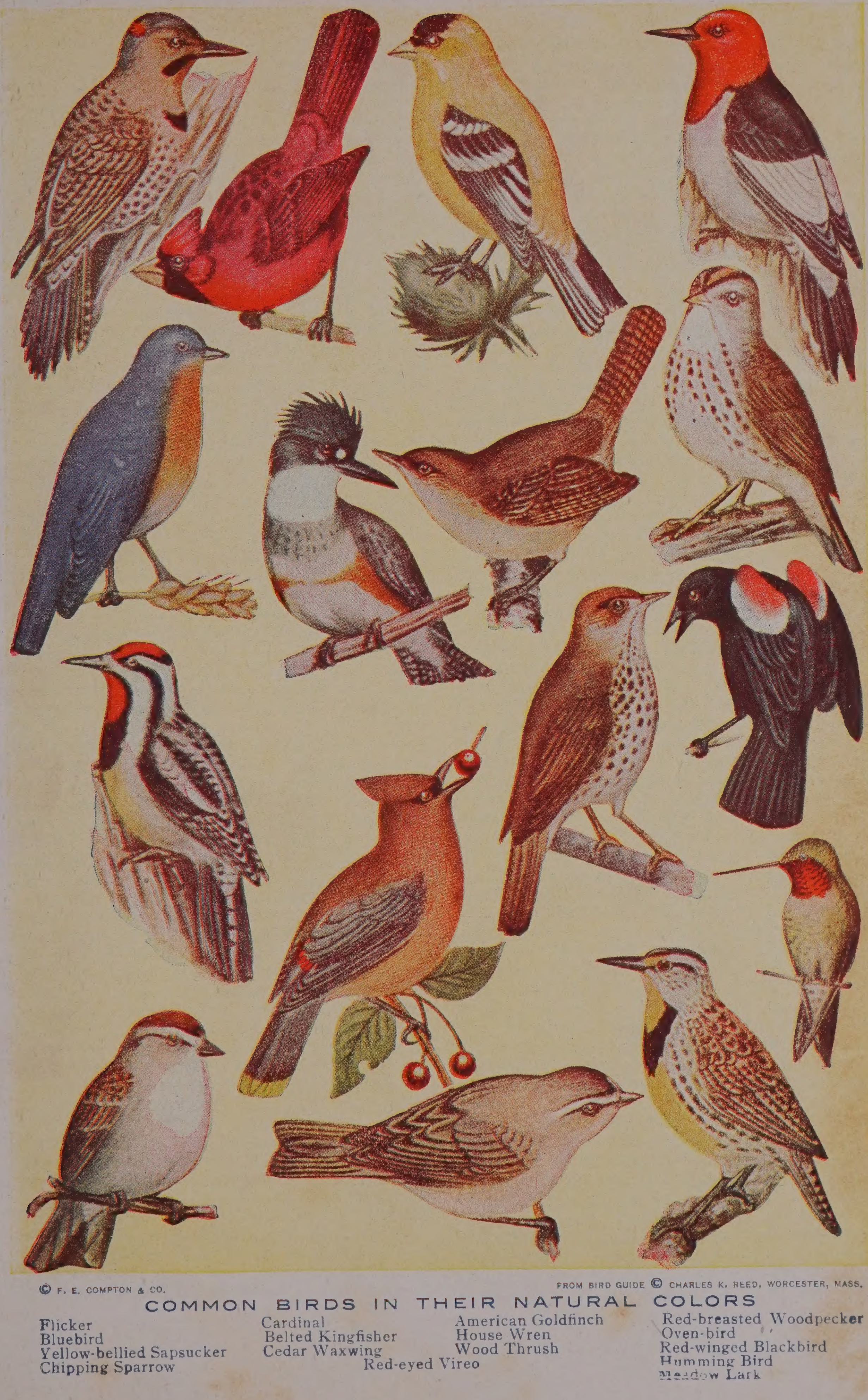
COMMON BIRDS IN THEIR NATURAL COLORS

Song Sparrow
Wood Pewee
Kingbird
Scarlet Tanager

Rose-breasted Grosbeak
Phoebe
Cowbird
Bobolink

Wilson Thrush
American Redstart
Purple Marten

Blue Jay
Catbird
Indigo Bunting
Orchard Oriole



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COMMON BIRDS IN THEIR NATURAL COLORS

Flicker
Bluebird
Yellow-bellied Sapsucker
Chipping Sparrow
Cardinal
Belted Kingfisher
Cedar Waxwing
Red-eyed Vireo
American Goldfinch
House Wren
Wood Thrush
Red-breasted Woodpecker
Oven-bird
Red-winged Blackbird
Humming Bird
Meadow Lark

are strong enough to hold the weight of a man. The basket-makers form a very large class. The mocking bird and the red-winged blackbird are familiar examples. A family of grosbeaks build a large, basket-like cluster of nests, sometimes as many as 800 in a single group. The weavers include the orioles, etc. The social weavers of Africa join together and build in tree-tops large grass canopies shaped like umbrellas. Among tailors is the bird of India, which usually makes its nests by sewing a dead leaf to a living one, making a sort of pouch, which is filled with fine down. The felt-makers, as the canary bird, build a closely woven nest, arranging the material like the fibre of felt. The nest of the hornbill is a hole in a tree, in which the female is made a prisoner during the period of incubation. She is locked up in the nest, by plastering the entrance, leaving only a small hole through which she is fed by the male. As interesting a bird structure as any is that of the swift, which makes the nest so highly prized by the Chinese, in bird's-nest soup. See Davie: *Nests and Eggs of North American Birds;* Dugmore: *Bird Homes.*

Birds-of-Paradise, the name given to an Australasian family of birds of very brilliant and varied plumage, no bird its rival in splendor. The history of the name is interesting. The early voyagers to the Moluccas were shown dried skins of these birds from which the feet and wings had been removed, and for several centuries thereafter, no perfect specimens were seen in Europe. About the year 1600, they came to be known as birds-of-Paradise. One writer of that period tells us that no one has seen these birds alive, for they live in the air, always turning toward the sun, and never alighting on the earth till they die, for they have neither feet nor wings. Even Linnæus, in 1758, named the largest kind the footless Paradise-bird, as no perfect specimen had been seen in Europe. During 1854-62 Alfred Russel Wallace was in the Malay Archipelago and was the first naturalist to observe these birds in their native haunts. They are now very common in museums, and some kinds are used in trimming ladies' hats, certain species having almost been exterminated owing to the milliners. Some are caught in snares, others are shot with blunt arrows by the natives.

There are twenty-five or thirty species of these Paradise-birds, including the great bird-of-Paradise, the largest kind, about eighteen inches from beak to tip of tail, the lesser bird-of-Paradise, etc. The males alone have brilliant and gorgeous plumage; the females are plain. Associated with the more brilliant kinds, in the same family, are the bower birds of Australia and New Guinea. They are all related to the crow-family and vary in size from that of the crow to that of the sparrow. The plumage is not only of great brilliance but also of the richest velvety appearance. In many species there are numerous long tufts of feathers that start from the shoulders and spread out and down in wondrous fashion. These are the prized bird-of-Paradise plumes used by the milliners. The various species show varied gorgeousness; the Paradise Minor is golden above with throat and top of head a metallic green, coppery red below, and with copper-red wings and tail, a great swirl of golden and white plumes completing its splendor; the King Bird is a glossy crimson above, divided by a band of metallic green about the throat from the white below, and has a fan of ashy plumes tipped with emerald. See Wallace: *Malay Archipelago.*

Birds of Passage are birds which are migratory, passing regularly with the seasons from one climate to another. Birds which breed in the United States and go south in the fall, returning to the north in the spring, are called summer birds of passage; while the wild geese which breed in the Arctic regions and visit the United States in autumn, flying north again in the spring, are winter birds of passage. Most of the migratory birds of the western United States pass the winter in Mexico. Birds of the eastern states winter in the south, West Indies, Central America and even (Bobolinks) in Brazil.

Birkenhead, an English seaport in Cheshire, on the left bank of the Mersey, opposite Liverpool. The population, 130,-832. It dates back to the 12th century, but has gained its present importance within recent years. It has several fine parks, one being 180 acres in extent, and a number of public buildings, such as a free library and public baths. In its neighborhood is St. Aidan's College. There is communication across the Mersey by bridge, by ferry and by a railroad tunnel, 1,230 yards long, which was opened in 1886. The docks are united with those of Liverpool. For some years Birkenhead has been noted for its shipbuilding yards, where have been built some of the largest iron ships afloat.

Birmingham, Alabama, founded in 1871 and called the Magic City of the South, is situated in Jones Valley, from which rises Red Mountain, and is the county seat of Jefferson County. It is close to almost inexhaustible supplies of iron ore, coal, limestone, oil and gas, and promises to rival Birmingham, England, and to become the greatest metal-workers' city in America. It has large rolling mills, which manufacture rail and bar iron, plate and sheet iron, steel and rail mills, and by-product plants, factories for making ice, glass, bridges, chains, steel cars, etc. Twenty-five furnaces in or near the city are now engaged in making iron. One company employes 10,000 men. The red and brown iron ores, found in enormous quantities in the region, make an excellent quality of steel, and the annual output is now very considerable, giving employment to many thousands. Nine railroads center here: The Southern, the Louisville and Nashville, the Seaboard Air Line, the Central of Georgia, the Alabama Great Southern (a part of the Queen and Crescent System), the Illinois Central, the Atlanta, Birmingham and Atlanta, the Birmingham Southern and the Kansas City, Memphis and Birmingham. Fine buildings are constantly going up, of which the magnificent Union Station, the First National Bank and Saint Vincent Hospital are good examples. The city has fine schools and churches, and includes among its public buildings a handsome courthouse, several high school buildings and many other fine civic institutions, including a million dollar building. Near by, at East Lake, is Howard College, a Baptist institution, and three miles west of the city is Birmingham College, the Methodist institution of the state. The population is 215,894. Birmingham furnishes a most striking example of the wonderful commercial development of the New South.

Bir'mingham, an English manufacturing city in Warwickshire, famed for its metal works, is situated near the center of England. From an early period it has made all kinds of metallic articles. The chief variety is the brass-working trade, in which 10,000 people are engaged. The next in importance is the manufacture of jewelry, gold, silver and gilt; then come small arms of all sorts. Other specialties are buttons, hooks and eyes, pins, screws, nails, steel pens, electric-plating and bell making. About 20,000,000 steel pens are made every week, and Birmingham has the monopoly of the screw trade in England. There are a large number of fine buildings, such as the City Hall, where musical festivals are held every three years, and great political gatherings, for which the place is famous. Mason and Queen's Colleges are situated here, together with several art galleries and libraries. A large number of fine statues adorn the place, among them those of Lord Nelson and Sir Robert Peel. The famous Soho works, founded by Watt and Boulton, where the first engines were made, are near Birmingham. The city is divided into seven districts, each of which returns a member to Parliament. The population, 570,113.

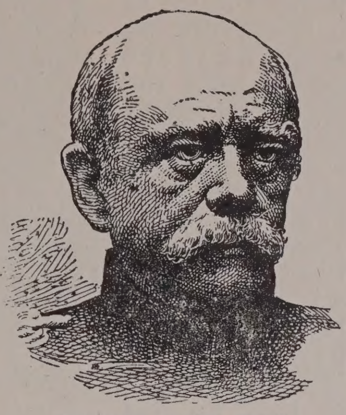
Bisbee, a city in Cochise County, Arizona, about thirty miles from Tombstone, is situated in a cañon of the Mule-Pass Mountains, and is a substantially built modern city. Noteworthy buildings are the Y. M. C. A., Y. W. C. A. library, the high and central schools. Bisbee has an admirable public-school system and several fine churches. Its copper mines are among the richest in the world, and the two of greatest importance are known as the Calumet and Arizona and the Copper Queen. The city has electric light, waterworks and an electric street-car system; also the service of the El Paso & Southwestern Railroad, by which it is connected (at Tucson) with the Southern Pacific. Bisbee, inclusive of its suburbs, has a population of 21,000.

Biscay (*bĭs'kā*) **Bay of,** an eastern arm of the Atlantic, extending from Ushant Island to Cape Ortegal, and flanked on the east by France and on the south by Spain. It is about 350 miles long by 300 miles in width. Violent circular currents, as well as storms, make the navigation difficult. The Spanish coast is rocky, but the French coast is low and sandy. The depth varies from 20 to 200 fathoms. The principal ports on the French coast are Bayonne, Bordeaux, Nantes, Rochefort, La Rochelle and Brest; those on the Spanish coast are Santander, San Sebastian and Bilboa. The Rivers Loire and Garonne flow into the bay.

Bismarck (*bĭs'märk*) **Archipelago,** is made up of what was formerly called the New Britain Archipelago, the Admiralty Islands and several other groups lying to the north and east of Kaiser Wilhelm's Land or German New Guinea. The white population in 1909 was 474, of whom 364 were Germans. The imports amount to 2,914,792 marks; the exports to 3,224,027, chiefly copra, with some cotton, coffee and kapok, a sort of cotton. The Archipelago was seized by England during the European war.

Bismarck, N. Dakota, since 1889 capital of the state, on the Missouri River. Four federal buildings are located here—an Indian school, an army post, a weather bureau and a modern building containing the new post office, the land office and the federal courts. The state buildings are the capitol and the penitentiary. The city has good grammar schools, a model high school, ample fire and police protection, good sewerage and well lighted streets. Sixteen wholesale houses have their home offices or branches here and there are three excellent banking institutions. It has the service of two railroads. The site of the town was visited by the explorers, Lewis and Clarke, but it was not until after 1875 that it was incorporated. Population, 8,000.

Bismarck, Otto Edouard Leopold von Prince, one of the greatest of modern statesmen, was born at Schönhausen, in Brandenburg, April 1, 1815, of an old and distinguished family. Educated at Göttingen, Berlin and Greifswald, he lived for awhile on his estates; but in 1847 entered politics as a member of the first Prussian parliament, where he sided with the conservatives. From that time forward he was the great champion of a united Germany, with Prussia at its head. He was sent as minister to St. Petersburg and Paris; and in 1862 was appointed minister of foreign affairs and prime minister. His policy was strongly opposed by the liberals, and for awhile he became very unpopular. At this time the rivalry between Austria and Prussia stood in the way of the reunion of Germany as a nation, and so Bismarck hurried on a war between these two powers which (1866–67) ended in forming the North German Confederacy, with Prussia at its head, and Bismarck as chancellor. In 1870, during the war with France, he was wont to accompany the army and King William, and was present on many battlefields and at the siege of Paris, while he negotiated the treaty of peace in 1871 Bismarck received the title of prince and was made chancellor of the new German empire. From that time his whole energy was given to fostering the commercial interests of the Empire and to further developing its strength in war. His unsuccessful attempt to form an alliance with Russia against France was part of this later purpose. Through the skillful deceit in which he was a past master, it was understood at the time to be intended to "keep the peace of Europe."


PRINCE BISMARCK

He was called the Iron Chancellor, and, from his own words in a speech, the man of blood and iron. Though not a polished orator, Bismarck had great power in the use of his native tongue, and his speeches were always strong and effective. He made many enemies and his life was frequently in danger. He was, however, a great national hero and his birthday, while he lived, was several times celebrated by the whole nation. During the brief rule of the Emperor Frederick, Bismarck retained his power, but the strong opposition to his plans by the Emperor William II led him to resign. He latterly lived in retirement on his estate. Prince Bismarck was tall and of an imposing presence, and had a piercing eye. Though imperious and even unscrupulous as a statesman, yet in private life he was genial, witty and entertaining. He died at Friedrichsruh, July 30, 1898.

Bismuth, a hard brittle metal having a bright metallic luster and a distinct reddish tinge of color. It melts at 518°, and expands, as water does, when it solidifies. It is used for making very fusible alloys. One of these, known as Wood's metal, consists of two parts bismuth, two parts lead, one part tin and one part cadmium, and melts at 1411°, a temperature that can be borne by the hand. Basic bismuth nitrate, frequently called sub-nitrate of bismuth, is extensively used in medicine. The greatest part of the bismuth comes from Saxony.

Bison, wild cattle, related to the ox, living in Europe and North America. The European bison was common in Europe in the times of ancient Rome, but is now confined to a few herds in the Caucasus and Ural Mountains. The European form eats buds, shoots and bark. When it was abundant, it did much harm in the forests. The true buffalo belongs to India and South America. In appearance the bison differs from the true buffalo in the high hump on its shoulders, the long hair with which the head is so heavily clothed, the heavy barb, and the fringe of long coarse hair on the forelegs

The American bison, popularly called buffalo, is the most famous of our hoofed animals. Once buffalo were almost unbelievably abundant here. In comparatively recent days herds derailed trains in the west and stopped boats on the Yellowstone and Missouri Rivers. Toward winter they migrated in an enormous company southward on their range, herd upon herd uniting. Various authorities repeat the story told of Col. Dodge's experience while traveling in Arkansas in 1871: "For twenty-five miles he passed through a continuous herd of buffalo;" the number estimated at 4,000,000. To-day there are probably less than 3,000 to be found in Canada and the United States together; this remnant saved in private preserve, public park and garden, in a desolate region in Canada southwest of Great Slave Lake, on the Flathead Reservation in Montana and in the Yellowstone National Park. In Corbin Park in New Hampshire there is a notable herd of pure-breed animals. The Oklahoma national forest also is a preserve for the rearing of buffalo. The range of the American bison was once 3,000 miles from north to south, 2,000 miles from east to west; in their migrations they climbed great mountains and swam mighty rivers. Their food was the herbage of plain and prairie. Vast expanses of land were marked by "buffalo paths," and still today the "buffalo wallows" show how hosts of these great creatures sought relief from flies and insects. They were indispensable to the Indian, furnished him with his chief subsistence. He dried great quantities of the meat and made use of the hide for shelter, clothing, boots and many other purposes—nothing was thrown away, the dried dung served for fuel.

The bison begins to shed its hair in March, shortly becomes quite bare, and to protect itself rolls in muddy sloughs until caked in an armour of mud. The new coat is fine by October, and at its best in November and December. The fur is valuable, the hide makes excellent leather.

and the meat is edible, almost like beef. A naturalist once shot a great animal that measured ten feet in length, its estimated weight 2,000 pounds. When at its best the American bison is of very splendid appearance. Hornaday thus describes one in perfect pelage: "The magnificent dark brown frontlet and beard of the buffalo, the shaggy coat of hair upon the neck, hump and shoulders, terminating at the knees in a thick mass of luxuriant black locks, to say nothing of the dense coat of fur upon the body and hind quarters, give to our species a grandeur and nobility of presence which are beyond all comparison with ruminants."

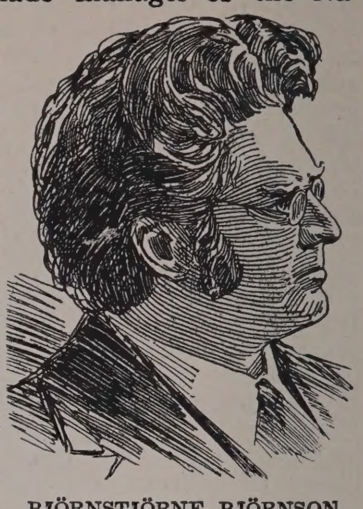
Greed brought to an end the life of this noble and most useful creature. Settlers coming in restricted the range and also ruthlessly slaughtered; sportsmen wantonly killed; and droves of hide-hunters had their full share in the extermination. See Hornaday: *American Natural History;* Stone and Cram: *American Animals.*

Bittern (*Botaurus Lentiginosus*), a nocturnal bird allied to the herons, widely distributed over North America and frequently found in marshy or reedy places in the eastern continents as well as in Australia. In size it varies from two to three feet in height, with a bill about three inches in length, and an expanse of wing close upon four feet. In its marshy haunts, it feeds at night on water-insects, fish, lizards and frogs. In the spring especially, at the breeding season, its notes have a bellowing, booming sound. Nesting on the ground, their eggs have a plain olive-green color, the birds themselves having a purple-brown tint, with occasional buff streaks on throat, breast and belly. They are very solitary in their habits, as well as shy and retiring.

Bitu′men, a general name applied to a variety of substances occurring beneath the earth's surface, and consisting principally of carbon and hydrogen, though often containing a little oxygen, nitrogen and sulphur. Natural gas represents one extreme of the bitumen series, and solid asphalt the other. Between these extremes are naphtha, petroleum, mineral tar, etc. Bitumen is very widely distributed, though its occurrence in quantities sufficient to make it commerically valuable is relatively rare. See NATURAL GAS, PETROLEUM, ASPHALT.

Bituminous Coal. See COAL.

Björnson (*byẽrn′ sŭn*), **Björnstjörne**, a celebrated writer of Norway, was born Dec. 8, 1832. While studying at the University of Christiania, he conceived a passion for the theater, and began his career as a writer by an historical drama. A few years later, when in Copenhagen, he published his beautiful story, *Synnöve Solbakken*, which at once became popular and marked an epoch in Norwegian literature. Soon after, he was made manager of the National theater in Bergen by its proprietor, Ole Bull. He published a series of national dramas from subjects taken from the old Norse sagas or legends. After a few years spent in Rome, Germany and France, he returned to Norway. The parliament voted him a yearly "poet's salary," so that he was free to devote his time to writing. He became director of the Danish theater at Christiania, and editor of the *Norse People's Journal.* He also took an active part in politics, and came to be an eloquent speaker. In 1881 he visited the United States, studying the workings of republican government and lecturing to his countrymen in the western states. Among his works are the so-called saga tragedies, *Limping Hulda, King Sverre, Sigurd Slembe* and others. The play, *Mary Stuart in Scotland*, is the only one taken from foreign history. Among his novels are *The Fisher Maiden, Arne, In God's Way, The Heritage of the Kurtz* and *The Bridal March;* he has also written shorter tales and poems. His later works dealt mostly with society and social reforms; among these are *The Editor, The King, A Bankruptcy* and *The New System.* Died April 26, 1910.



BJÖRNSTJÖRNE BJÖRNSON

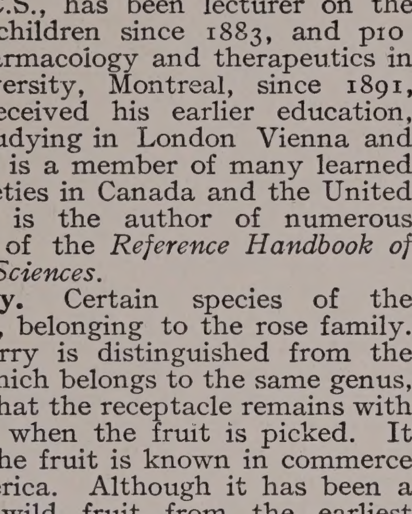
Black, Jeremiah Sullivan, American jurist and statesman, was born in Pennsylvania in 1810, and died there Aug. 19, 1883. In politics he was what is known as a Jeffersonian Democrat, and was prominent as a lawyer, taking part, at one period of his professional career in the Vanderbilt will contest. In 1851 and again in 1854 he was elected one of the supreme court judges of Pennsylvania, and from 1857 to 1860 he was attorney-general in President Buchanan's administration, and afterward (1860–61) was secretary of state. In the latter year (1861) he retired from public life.

Black, William, a British novelist, was born at Glasgow in 1841, where he was educated and studied art. He was, however, led to writing, and did his first work for a Glasgow newspaper. He afterward went to London, where he wrote for several magazines. During the war between Prussia and Austria, in 1866, he was war correspondent for the London *Morning Chronicle.* He was afterward editor of the *London Review* and assistant editor of the *Daily News*. In 1875 he abandoned journalism and devoted himself to writing fiction. He visited America in 1876. *A Daughter of Heth* was Black's first really successful work, and *A Princess of Thule* is perhaps his finest romance. Other works are *Strange Adventures of a Phaeton, Madcap Violet, Macleod of Dare, White Wings, Sunrise, Shandon Bells, Judith Shakespeare* and *Strange Adventures of a Houseboat.* He died at Brighton, Dec. 10, 1898.

Black'ader, Alexander Dougall, B.A., M.D., M.R.C.S., has been lecturer on the diseases of children since 1883, and professor of pharmacology and therapeutics in McGill University, Montreal, since 1891, where he received his earlier education, afterward studying in London Vienna and Prague. He is a member of many learned medical societies in Canada and the United States, and is the author of numerous articles and of the *Reference Handbook of the Medical Sciences.*

Black'berry. Certain species of the genus *Rubus*, belonging to the rose family. The blackberry is distinguished from the raspberry, which belongs to the same genus, by the fact that the receptacle remains with the druplets when the fruit is picked. It seems that the fruit is known in commerce only in America. Although it has been a well-known wild fruit from the earliest settlement of this country, it has recently been developed as a garden fruit.

Blackbird, a common name for a number of birds of black plumage, some of them only distantly related. In America several birds receive this name. The crow-blackbird or purple grackle is one of the common blackbirds; it lives in flocks. The rusty blackbird is less common. The red-winged blackbird is abundant in swamps and marshes of the United States. It is, really, a starling. The common blackbird of Great Britain and Europe is the merle; it is closely related to the American robin, which it resembles in form and habits, but is, of course, black. It is a true thrush.



BLACKBIRD

Black'burn, a manufacturing town in Lancashire, England, twenty-one miles northwest of Manchester. Its population is over 133,004. Its importance dates back to the 17th century. Its chief industry now is cotton manufacture, in which it leads the world, having a large number of cotton factories, many of them employing from 1,000 to 2,000 hands. Among the improvements in the machinery for spinning cotton which are traced to Blackburn is the spinning jenny, invented in 1707 by James Hargreaves, a native of the town. The chief public buildings are the town hall, the Gothic exchange and the infirmary. It has a grammar school, founded by Queen Elizabeth in 1567. Blackburn sends two members to Parliament.

Black'feet, a tribe of Indians of the Algonquin family, living in the states of Montana and Wyoming, on the eastern side of the Rocky Mountains, between the Yellowstone and the Missouri River, and also in northwestern Canada. They number about 6,000 in Canada, and 7,000 in Montana and Wyoming. They are divided into the *True Blackfeet*, the *Bloods*, the *Pigeons* and the *Small Robes.* In the early days of the west they were a powerful tribe, given to robbery and hostile to the whites, but have been friendly and peaceful for a number of years, though in 1865 they were involved in troubles with miners. In 1870 a large number were massacred. They differ from the other Algonquin tribes in worshiping the sun instead of the Great Spirit. A brief vocabulary of their dialect has been published by George Catlin in his *North American Indians.* They must not be confounded with the Blackfeet Sioux.

Black Forest, a wooded mountain chain in Baden and Württemberg, running northeast and southwest along the course of the Rhine. The chief rivers rising in it are the Danube and the Neckar. The loftiest elevation is reached in the round-topped Feldberg, and is 4,903 feet high, above the narrow valley of Höllenthal, connected with Moreau's famous retreat in 1796. The Kaiserstuhl or Emperor's Chair is a great mass west of the main chain. Its numerous valleys are beautiful. The legends of many centuries cluster around the whole region. Silver, copper, cobalt, lead and iron are found, and the mineral waters are famous, especially those at Baden-Baden. Some farming is done, but cattle rearing and the manufacture of wooden articles, such as clocks, musical boxes and toys, form the chief industries. Of these articles, 600,000 are exported yearly to all parts of the world. A railroad encircles the forest, and numerous lines cross it. The engineering has been very difficult, the line between Freiburg and Neustadt rising in elevation 2,000 feet in twenty-two miles. The region forms a district in Württemberg, Germany, area, 1,844 square miles, with a population of 541,662, largely Protestant.

Black Hawk, a famous Indian chief of the Sac and Fox tribe, was born about 1768 on the east shore of the Mississippi, near the mouth of Rock River. When about twenty years old, he succeeded his father as chief of the Sacs. In the War of 1812, he took part with England. When the remainder of the tribes removed to their reservation across the Mississippi, Black Hawk, with his followers, remained. Some years after, war began with the whites, and after a number of the whites had been massacred, the Indians were driven to the Wisconsin River and twice defeated, and Black Hawk was captured. A treaty was made, and the Indians were removed to the region near Fort Des Moines. Black Hawk and his two sons were taken as hostages through the cities of the East. They were confined for a time in Fortress Monroe, but were allowed to rejoin their tribes in 1833. Black Hawk died in Iowa in 1838.

Black'heath, an open common of seventy acres in extent, in the county of Kent, England, seven miles from London. Many schools are situated here. It is famous in English history. Here were the insurrections of Wat Tyler, of Jack Cade and of the Cornishmen under Lord Audley; here the Danes encamped in 1011; here the Londoners welcomed Henry V from Agincourt; and here Charles II on his way from Dover met the army of the Restoration. It was, for a long time, a noted place for highwaymen.

Black Hills, a range of mountains in South Dakota and Wyoming, about 100 miles long and 60 miles wide, or an area of about 6,000 square miles. They are a continuation of the Big Horn and Snow Mountains, which branch off from the Rockies. The highest point is Laramie Peak, in Wyoming, nearly 8,000 feet above sea-level. About one third of the area is covered with vast forests of black pine, giving the name to the mountain range. Gold has been discovered and extensively mined in the Black Hills, and other mineral wealth is believed to be abundant. The value of the mineral products of South Dakota in 1905, which were chiefly gold, was close upon seven million dollars; though this is a large falling off from the era of the seventies, when the region was opened to settlement. Harney Peak is the most elevated point in the Black Hills, reaching an altitude of over 7,200 feet.

Black' more, Richard Doddridge, a well-known novelist, was born in Berkshire, England, in 1825, and graduated at Exeter College, Oxford. He studied law, and was called to the bar, but practiced only a short time. He was fond of gardening, and so, in his novels, his descriptions of nature are his best efforts. With the exception of *Lorna Doone, a Romance of Exmoor,* his works lack movement and life. *Lorna Doone* however, is considered one of the best romances in the English language. Other stories are *Springhaven, Alice Lorraine* and *The Maid of Sker.* He has also translated the *Georgics* of Vergil. He died Jan. 20, 1900.

Black Mountains, a group of mountains in the western part of North Carolina, a few miles west of the Blue Ridge and belonging to the Appalachian system. The name comes from the forests of dark balsams on its summits. It has twelve peaks, all higher than Mt. Washington, the highest being the Black Dome or Mitchell's Peak, as it is called in honor of Dr. Mitchell, of the University of North Carolina, who perished while exploring the mountain and was buried on its top. The height of this peak is 6,707 feet—the highest point of the United States east of the Rocky Mountains.

Black Sea or **Euxine,** meaning "hospitable," is an inland sea lying between Europe and Asia. Its greatest length is 720 miles, its greatest breadth 380 miles, and it covers 163,711 square miles or, including the Sea of Azov, 172,500 miles. It is thus more than five times as large as Lake Superior. Its depth in the center is over a thousand fathoms. It is connected with the Sea of Azov on the northeast, and flows into the Bosphorus, the Sea of Marmora and the Dardanelles. Many large rivers flow into it, and it drains nearly one-quarter of the surface of Europe, besides a large area of Asia. There is only one island in it, the Adassi or Isle of Serpents, opposite the mouths of the Danube. There are many important ports along the coast, such as Kustendji, Odessa, Trebizond and Sebastopol. In summer navigation is safe and easy; but in winter, when the sea is closed on every side, conflicting winds rage over it, and short but terrible storms are frequent. There is no tide, but the large rivers flowing into it give rise to currents. The sea has been known and navigated from a very early period. For many years it was under the control of Turkey alone, but now both Russia and Turkey maintain fleets in its waters, and it is open to the commerce of all nations.

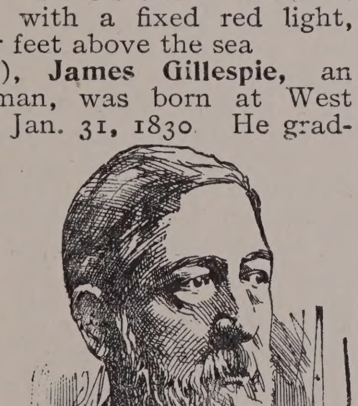
Black Snake, in many localities called blue racer, is common in nearly all parts of the United States. Its length varies from four to six or seven feet, and it moves very rapidly. It feeds on frogs, lizards, mice and eggs, occasionally captures a young chicken, and drinks cream and milk in dairies. It has no poison fangs, but the embrace of its coils is powerful. The name is also applied to poisonous black or blackish serpents of the eastern hemisphere.

Blackstone, Sir William, an English commentator on law, was born in London in 1723, and after his college and law studies he began the practice of law. He was not at first successful, but, after delivering a course of lectures at Oxford on the law of England, was made professor of English law there Later he was made a king's counsel, entered parliament, was appointed solicitor-general to the queen, was knighted, and finally appointed a justice of the court of common pleas. He published in four volumes his Oxford lectures, which form his celebrated *Commentaries on the Law of England.* He died in 1780.

Black'well, Elizabeth, the first woman who received a medical diploma in the United States, was born in England in 1821, and with her family emigrated in 1832 to the United States. She taught for some years at Cincinnati, helping to support a large family of brothers and sisters. After much difficulty she was admitted to the Medical School at Geneva, N. Y., from which she graduated with honors in 1849. She next visited Europe in furtherance of her studies, and was admitted into hospitals in Paris and in London. In 1851 she returned to the United States and began a successful practice in New York, where she has mostly resided. In 1859, with her sister, she opened the New York Infirmary for Women and Children. In 1869 she delivered a course of medical lectures in England. She has written several popular books on the laws of health, especially for girls, besides a volume entitled *Pioneer Work in Opening the Medical Profession to Women* (1905.) On all questions of social reform and the status of woman she has always taken an active part.

Black' well's Island is in the East River and is part of New York city. It has an area of 120 acres. It is the seat of many of the penal institutions of the city. It has a lunatic asylum, an asylum for the blind, a workhouse, almshouse, penitentiary and several hospitals. On its north end is a stone lighthouse, with a fixed red light, which is fifty-four feet above the sea

Blaine (*blān*), **James Gillespie,** an American statesman, was born at West Brownsville, Pa., Jan. 31, 1830. He graduated at Washington College in 1847, and then taught for two years in the Western Military Institution, Georgetown, Ky. After studying law and being admitted to the bar, he removed to Augusta, Me., where he took charge of the *Kennebec Journal.* When the Republican party was formed, he became prominent as a public speaker; was chairman of the state committee of that party; and served four years in the state legislature, being speaker of the house for two years. He edited the Portland *Advertiser*, and in 1862 entered Congress, where he soon showed himself an able and ready debater, and, on the death of Thaddeus Stevens, became leader of his party in the house. From 1869 to 1875 he was speaker, and in the latter year was chosen senator from Maine. During the short administration of President Garfield, Blaine was secretary of state, and, on the death of his chief, he retired to his home in Augusta, having first delivered an eulogy on Garfield before the two houses of Congress He now began to prepare his *Twenty Years of Congress*, a review of American political history during 1861–81, and had issued the first volume when he was nominated for the presidency in 1884, but was defeated by Mr. Cleveland. The next few years were spent in literary work and in visiting Europe, and when Mr. Harrison became president, in March, 1889, Blaine again became secretary of state. Here he carried out the scheme of a Pan-American congress, which he had begun in his former short term, and was chosen chairman of the meeting. The policy of reciprocity with other American states, at his suggestion, became a feature of the McKinley tariff law In June, 1892, Blaine resigned from the cabinet. He died at Washington. D. C., Jan. 28, 1893.



JAMES G. BLAINE

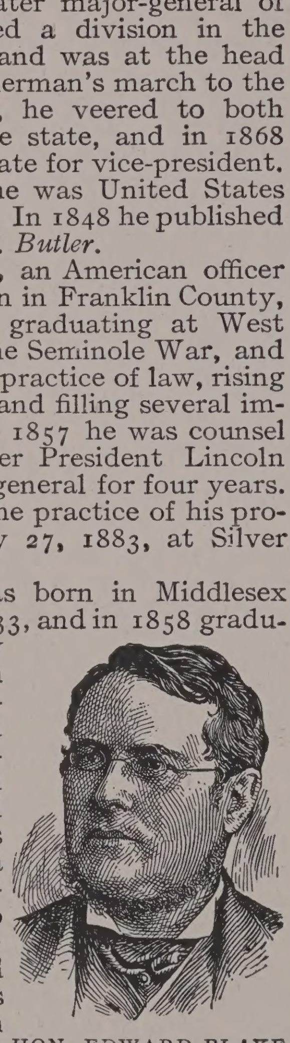
Blair, Hon. Andrew George. born in Frederickton, New Brunswick, in 1844. Called to the Bar in 1866. Entered New Brunswick Legislature in 1878. Leader of the Opposition in 1879. Remained in the Legislature until 1896. In 1883 defeated the Hannington Government and formed a new Government. His Government was sustained at four general elections. Member of the Inter-Provincial Conference held at Quebec, 1887. Elected to the House of Commons and joined the Laurier Administration in 1896 as Minister of Railways and Canals. Secured the extension of the Intercolonial Railway from Levis to Montreal in 1898. While he was Minister the St. Lawrence canals were deepened to 14 feet from the Great Lakes to the sea.

Blair, Francis Preston, journalist and politician, and founder and editor for a time of the *Washington Globe*, was born in Virginia in 1791, and died in Maryland, Oct. 18, 1876. He took an active part in politics before and after the War of the Rebellion, and on both the Democratic and the Republican side. In 1856 he was instrumental in organizing the republican party and in 1860 was one of the leaders who nominated Lincoln for the presidency. During the war he sought to bring about peace in the South. After Lincoln's death he was, however, opposed to the Republican reconstruction policy, and returned to the Democratic camp.

Blair, Francis Preston, Jr., American politician, major-general of volunteers and son of the foregoing, was born at Lexington, Ky., Feb. 19, 1821, and died at St. Louis, July 9, 1875. A graduate of Princeton and student of law, he became a member of the Kentucky bar and practiced for a time at St. Louis. In 1845 the state of his health took him westward to the Rockies, and there he took part in the war with Mexico. Later on, he became editor of the *Missouri Democrat*, and represented his state in the legislature. He was elected to Congress as a republican in 1856, and was re-elected in 1862. When the Civil War broke out, he became colonel and later major-general of volunteers, commanded a division in the Vicksburg campaign, and was at the head of the 17th corps in Sherman's march to the sea. Like his father, he veered to both political parties in the state, and in 1868 was democratic candidate for vice-president. From 1870 to 1873 he was United States senator from Missouri. In 1848 he published a *Life of General W. O. Butler*.

Blair, Montgomery, an American officer and politician, was born in Franklin County, Ky., in 1813. After graduating at West Point, he served in the Seminole War, and then entered upon the practice of law, rising high in the profession and filling several important positions. In 1857 he was counsel for Dred Scott. Under President Lincoln Blair was postmaster-general for four years. He then returned to the practice of his profession, and died July 27, 1883, at Silver Spring, Md.

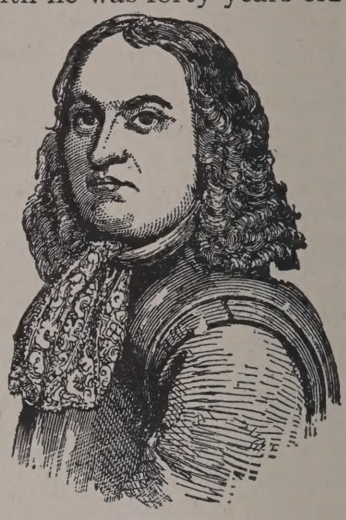
Blake, Edward, was born in Middlesex County, Ontario, in 1833, and in 1858 graduated at the University of Toronto, of which he was elected chancellor in 1876. Elected to the Ontario legislature in 1867, he led the Opposition till 1871, when he was called on to form a government. He resigned the Ontario premiership in 1872 after a brilliant and successful career in its local legislature. In 1867 he had been elected to the Canadian House of Commons.



HON. EDWARD BLAKE

At the request of the leaders of the Irish Parliamentary party, he went to Ireland in 1892 and was elected Member for South Longford. In 1904 elected a member of the Executive Committee of the Irish Party. A member of the Royal commission to inquire into the financial relations between Great Britain and Ireland. In 1896 one of the committee of 15 of the House of Commons to investigate South African affairs and the causes of the Transvaal raid. His cross-examination of Cecil Rhodes was the leading feature of the investigation. Elected Chancellor of the University of Toronto in 1876, contributed generously to its funds. Engaged frequently in very important cases before the Privy Council. One of the greatest advocates of the day of any country.

Blake, Robert, the greatest English admiral next to Nelson, was born at Bridgewater in 1598. Until he was forty years old he lived quietly in England as a country gentleman. Entering the army on the side of Cromwell, he distinguished himself by defending Taunton against the Royalists for a year, and in 1649 he was appointed with two others to command the fleet. Within two years his energy had built up the fleet, blockaded Lisbon, destroyed the squadron of Prince Rupert, and forced the royalists to give up their last strongholds. At this time the Dutch were masters of the sea, and in 1652 Blake began his struggle with them. After several battles with the great Dutch admirals, in February, 1653. Blake defeated Van Tromp in a long running fight which extended from Portland to Calais, and within a few months, instead of Van Tromp's scouring the channel with a broom at his masthead, the English had established their naval supremacy. In 1654 he made the fleet of England respected in the Mediterranean. The last exploit of the great admiral, however, was his greatest and most daring one. In 1657, hearing that a Spanish fleet had arrived at Santa Cruz, he at once sailed thither, where he found sixteen ships lying in the semicircular bay, protected by a castle and six or seven forts. Dashing boldly in by night, he completely destroyed the ships and the town, and withdrew with little loss. This exploit excited great enthusiasm in England and admiration throughout Europe. After this his health failed rapidly and he died on his way home, as he was sailing into the harbor of Plymouth, Aug. 17, 1657.



ADMIRAL BLAKE

Blake, William, an English artist and poet, was born in London, in 1757. As a boy he was dreamy and spent his time in drawing and verse making. After studying art for some years, he began to paint in water colors, and to engrave illustrations for magazines. At the same time he wrote poetry which showed great power and beauty. *Poetical Sketches, Songs of Experience* and *Songs of Innocence* are among his best works. Most of his other poems are strange and mysterious, and are valuable chiefly because of the wonderful way he had of illustrating and printing them in various colors, which he said had been revealed to him. Among these quaint and now rare editions are *Book of Prophecies, Gates of Paradise, Vision of the Daughters of Albion* and *America*. During his life, Blake's genius was little recognized, but many now believe that England has not produced his superior in force and originality. He died in London, Aug. 12, 1827.

Blanc (*blän*), **Jean Joseph Louis,** a noted French socialist and historian, was born at Madrid in 1811. He studied at Paris and wrote for several newspapers, and in 1839 founded the *Review of Progress*, in which he brought out his chief work on socialism, the *Organization of Labor*. This work, which proposed to establish social workshops connected with the government, and with an equal profit to the laborers, was at once widely popular among the French workmen. His next work, *The History of Ten Years*, was aimed at the royal government. It was followed by his *History of the French Revolution*. In the revolution of 1848 Blanc took some part, but was soon after accused, without reason, of participating in the civil disturbances which took place in Paris, and he escaped to England. Here he remained many years, engaged in writing, and on the fall of the empire, in 1871, he returned to France. He was elected to the national assembly, and later became a member of the chamber of deputies. He died at Cannes, Dec. 6, 1882.

Blanc, Mont. See ALPS.

Blarney Stone, a famous stone in the ruins of old Blarney castle, near Cork, which is said to give to one who kisses it the power of saying agreeable things. From this story comes the word *Blarney*, a term for complimentary or flattering talk.

Blast Furnace, a furnace in which the burning of fuel is increased greatly by a blast blown from a bellows or by means of fans or other blowing-engines. Blast furnaces are used mainly for smelting iron, copper and lead ores. See METALLURGY.

Blasting, the method of loosening or breaking in pieces masses of rock by means of the explosion of gunpowder or dynamite. It is used in sinking shafts, cutting tunnels, building roads and railroads and clearing channels. Formerly a form of slow burning gunpowder was used, but in 1868 nitroglycerine was used for the first time in boring the Hoosac tunnel. Now similar high explosives are universally used for blasting. Nitroglycerine is an explosive chemical compound made by treating glycerine with nitric and sulphuric acids. It is often mixed with an absorbent material, as sawdust, and dynamite is a general term for high explosives of this kind. The explosive is placed in holes which are drilled in the rock by hand or power drills, and exploded either by slow burning fuses or more generally by an electric spark. The removal of Flood Rock at Hell Gate in the East River, New York, October, 1885, was done by this method, and was the largest blast ever made. The rock covered about nine acres, 21,669 feet of tunnel were made, over 40,000 pounds of high explosives were used, and 80,232 cubic yards of rock excavated.

Blavatsky (*blä-vät'skĭ*), **Madame Helena Petrovna,** a Russian theosophist and founder of the Theosophical Society, was born in Russia in 1831. She was of noble descent and married a Russian councillor of state, from whom, however, she separated early in her married life. Fond of travel, she found her way to Tibet, where she claims she received the theosophical doctrines connected with her name. From 1873 to 1879 she was a resident of New York, when she founded the Theosophical Society and published *Isis Unveiled*. Her other writings include *The Key to Theosophy, The Secret Doctrine, The Voice of Silence*, etc. She died in London, May 8, 1891.

Bleaching (from the Anglo-Saxon *blaec*, pale), the process of whitening textile fabrics (cotton, linen and silk, also wool) by removing coloring matters and substances naturally present, or adhering to them in the course of their manufacture. In early days it used to be the custom to send Scotch linens to be bleached in Holland, and the latter name is still used for a kind of unbleached linen. The term *lawn*, which continues in use, received its name from being spread on lawns or cultivated grass fields for bleaching purposes. Besides linen and cotton, wool, silk, jute, paper and now even wood are submitted to the bleaching process. The term bleaching is moreover applied to the decolorizing of castor-oil, bees-wax and other fatty materials by exposure to sunlight. Scouring and bleaching are now largely effected by the use of chemicals and volatile liquids, soda ash, resin soaps and more or less caustic alkalis being utilized in place of baths of lime, lye and sulphuric acid. For the bleaching of silk, after scouring, sulphur dioxide is used, or, better still, hydrogen peroxide. As a bleaching agent, chloride of lime or bleaching powder is resorted to for the removal of metallic and other colors in calico-printing.

Bleak House, a novel written by Charles Dickens during 1852-3. This novel was in part a satire on the long delays of the Court of Chancery; but the story itself is a great favorite. It has been said that the dreary residence from which the name of the book is taken was suggested to the author by a residence at Broadstairs, Kent, where Dickens lived in summer.

Blenheim (*blĕn'ĭm*), a village of Bavaria, 23 miles northwest of Augsburg, famous as the scene of the Duke of Marlborough's great victory over the French and Bavarians, Aug. 13, 1704. The two armies numbered about 50,000 on either side. The French and Bavarians lay in a strong position, and the attack was made by the English and Austrians, with their allies, headed by the Duke of Marlborough, the great English general, and Prince Eugene. The onset was long resisted, until Marlborough, by two desperate charges, which he led in person, broke the enemy's line and decided the day. Of the defeated army only 20,000 escaped. Twelve thousand were killed and 14,000 captured. The battle is also called the battle of Höchstadt, from the name of another small village near by. Near Blenheim, also, the French defeated the Austrians in 1800.

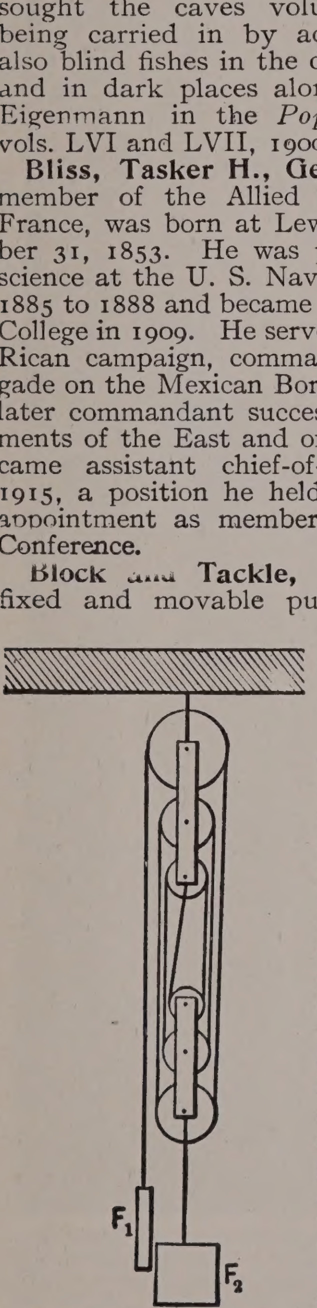
Blennerhas'sett, Harman, known in connection with Aaron Burr's conspiracy, was born in England about 1764. He was of an Irish family, but, becoming dissatisfied with Ireland, sold his Irish estates for a sum exceeding $100,000 and came to America. He bought an island of 170 acres in the Ohio River near Parkersburg, W. Va., and built on it a fine mansion and adorned his home with all the comforts and refinements which culture could suggest and wealth supply. Many visitors enjoyed his hospitality, and among them Aaron Burr, still bitter because of his political defeat. He filled Blennerhassett's mind with plans of forming an empire in Mexico, for which he made extensive preparations. When Burr was arrested and brought to trial, Blennerhassett was arrested, but on the acquittal of Burr, he was released. His fine property was sold to creditors, and his later life was clouded and unhappy. He died on the Island of Guernsey in 1831.

Blight, a diseased condition of plants, causing deadening of the stems or roots, yellowing and early falling of the leaves, or shriveling and premature decay of the fruit. In a restricted sense the word refers to a certain mildew affection of the leaves. Blight exists among plants in their wild state, and is often aggravated by cultivation. Though pre-eminently a fungous disease (see FUNGI), it may appear, as often shown by the foliage turning yellow, from the roots being poorly supplied with food and air. From the standpoint of the producer, blights may be roughly classed as the rusts and smuts of grains, blights of orchard and shade trees, of small fruits and grapes and of garden products; though several or all of these sorts of plants may be attacked by fungi that are similar, botanically, or are the same thing. Often a single species of blight-producing fungus will pass through several stages of development on entirely different plants, as in the case of wheat rust. (See ÆCIDIOMYCETES.) Damage to cereals from rust and smut in the United States amounts to from $25,000,000 to $30,000,000 yearly. While rust is common, it causes damage only when cool, damp weather allows it to mature more rapidly than the grain. While the black spores (q. v.) of rust live over the winter, in the case of those orchard blights affecting the wood, only those spores survive where the dead and healthy tissues meet. Here form, in the spring, the familiar sweet masses of "gum," which attract insects and so scatter their spores. All branches showing such hold-over blight should be pruned out. Certain apple rusts pass one stage in the jelly-like masses, commonly noticed on cedar trees after spring rains, and popularly known as cedar-apples. Some typical fungous diseases are the blights, mildews, scab and rot of potatoes beet-root rot, peach-leaf curl, apple scab, rye ergot, corn smut, loose and stinking smut of wheat, wilt disease of flax and of cow-peas. Often the ground becomes infected, as in several of the above, and must be abandoned as regards the susceptible crop. Potato scab and smuts that are transmitted by the seed are prevented by treating the seed with a weak solution of 4 per cent. formaldehyde (one pint to 45 gallons of water). Blight on trees and small fruits, as well as insect pests, is fought by spraying (see SPRAYING MIXTURES), which kills the parasite without injuring the host. The Department of Agriculture investigated a leaf-blight that ruins nursery seedlings (see GRAFTING), and showed by experiment on 100,000 young trees that treatment costing but 90 cents per 1,000 trees netted profits averaging $13 per 1,000, and going as high as $40. Other experiments showed that at an expense of 15 cents per fruit-bearing tree, the marketable product could be increased 25 to 50 per cent. Black rot affecting grapes was first studied by the Department, which discovered a treatment increasing the yield 20 to 80 per cent. In five years its methods were used by 50,000 grape-growers. Plant breeding (q. v.) is used to increase the power of resisting not only insects and fungi but blight induced by climatic conditions and inherent weakness which, in the case of the California raisin grape, sometimes results in a loss of a million dollars in a single year. References: Bulletins of the Department of Agriculture and of the State Experiment Stations.

Blind Fishes. The caves of the United States are inhabited by six species of fish with imperfect eyes. Five of them have rudimentary eyes, and in one the eyes are very degenerate. They belong to the family *Amblyopsidae.* They are small fishes related to minnows. Their senses of hearing and touch are highly developed and enable them to capture prey. The formation of these blind animals is an interesting problem. They respond negatively to the stimulation of light, and doubtless they sought the caves voluntarily instead of being carried in by accident. There are also blind fishes in the depths of the ocean and in dark places along the shores. See Eigenmann in the *Pop. Science Monthly,* vols. LVI and LVII, 1900.

Bliss, Tasker H., General, U. S. A., an member of the Allied War Conference in France, was born at Lewisburg, Pa., December 31, 1853. He was professor of military science at the U. S. Naval War College from 1885 to 1888 and became president of the War College in 1909. He served through the Porto Rican campaign, commanded a division brigade on the Mexican Border in 1911, and was later commandant successive of the Departments of the East and of the South. He became assistant chief-of-staff February 15, 1915, a position he held at the time of his appointment as member of the Allied War Conference.

Block and Tackle, a combination of fixed and movable pulleys, employed to secure what engineers call a large "mechanical advantage." There are various forms, of which that represented in the figure will serve as a type. Here one rope passes over each of the pulleys. And since each movable pulley gives a mechanical advantage of two, it is evident that with the block and tackle shown in the figure one is able to exert a force nearly six times as great as without its aid. If no energy were used up inside the mechanism, one could lift exactly six times as much with as without the tackle. It should be carefully observed that one secures no gain in energy by this device. The energy stored up in a lifted mass is always a little less than the energy required to lift it, whether a block and tackle be used or not.



BLOCK AND TACKLE

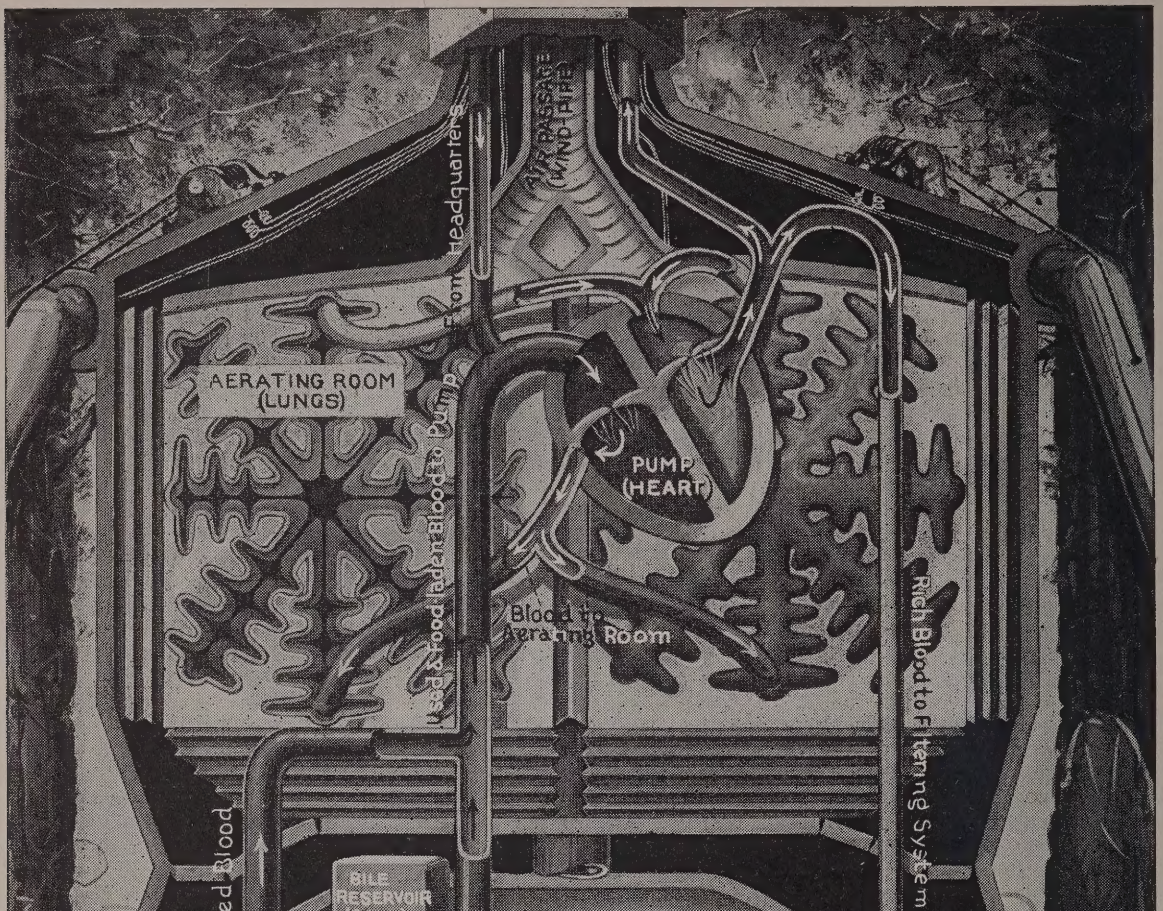
Block System, a system of signals at intervals along a line of railroad, intended to decrease the danger of accident. The system of telegraphing the arrival of a train from station to station, used in England as early as 1839, may be quoted as its origin. It was first introduced into the U. S. in 1876 by the Pennsylvania railroad. In general the block system divides a line into sections, upon each of which only one train is admitted at a time. The system of giving staffs, a staff being given to a train by a station-master only when one has been returned by the train previously upon that section, is a variety of block system which is adapted only to single lines. To keep the sections clear for any one train it adds the additional safeguard of an interval of space to the universal practice of an interval of time between trains. The expense of the block system is sometimes lessened by automatic devices for block signals which minimize the direct manipulation of levers by signalmen.

Blockade, in naval warfare is the shutting up of a port of a country, cutting off communication with the outside world. It is effected by stationing a sufficient number of ships off the ports to make entrance impracticable. Neutral powers, because the interference with their commerce injures them, must be fully notified of the blockade by the state that attempts it. Then endeavors to deal with the ports blockaded become contrary to the law of nations, and attempts to trade with such ports render ships and cargoes liable to confiscation. But if blockades are to be binding on neutrals, they must not merely be blockades on paper or blockades by proclamation. They must also be physically effective. Among famous blockades are that of the European coast from Denmark to Italy in 1807–8, when Napoleon was fighting England; the Crimea in 1854–6 by England, France and Sardinia; the coast of the Confederate States by the Federal Government during 1861–5.

Bloemfontein (*bloom'font-in'*), capital of the late Orange Free State (now the Orange River Colony), in South Africa. The State joined the burgher republic of the Transvaal in the war with Britain, and the capital (Bloemfontein) was entered and occupied by the British under Lord Roberts, March 13, 1900. The population is 33,900, of which more than 15,000 are whites and the rest natives.

Blood, the circulating fluid of animals. It is a nutrient fluid of varied composition. In the course of its circulation it is continually giving nourishment to the tissues

AERATING, SEPARATING AND STORAGE SYSTEM


AIR PASSAGE (WIND-PIPE)
From Headquarters
Used & Food-laden Blood to Pump
AERATING ROOM (LUNGS)
PUMP (HEART)
Blood to Aerating Room
Rich Blood to Filtering System and Outlying Parts of Body
Used Blood
BILE RESERVOIR (GALL)
FOOD STORAGE
SEPARATOR
Food-laden Blood

Here we follow the blood through the body, first through the separating room, or liver, which not only acts as a separator, but also stores up food to keep the body going between meals. Into the pipe leading from the separating room is emptied used blood from the lower parts of the body and from headquarters through two additional pipes, and the common stream flows on to the heart pump, which forces it to both sides of the aerating room, where it is spread out and exposed to the fresh air for purification. Then back it goes to the left side of the pump and is sent into the body again for use.

and carrying away from them worn-out material. Therefore, it carries on a sort of exchange with the tissues, in which there are certain sources of loss and certain sources of gain to the blood. For example, it loses to the tissues soluble food material and oxygen; in the lungs it loses carbon dioxid (CO_2); through the skin it loses water and certain salts in solution; and through the kidneys it loses the broken-down protoplasm that contains nitrogen and water. But the gain keeps pace with the loss; in the lungs it receives oxygen; from the digestive system it receives soluble food material and water; from the tissues it receives the broken-down material in the form of carbon dioxid, water and nitrogenous waste. From these statements it will be seen that the blood is the agent of exchange between the tissues and the outside world.

There is a similar circulating fluid in insects, mollusks, worms and other simple animals as well as in the vertebrated animals. Contrary to the usual statement, this fluid in the simpler animals, also, contains solid particles or corpuscles, though they correspond with the white blood corpuscles rather than with the red ones. In the fluid part of the blood of the crayfish, also, for example, there is a substance which acts as an oxygen carrier.

As everyone knows, the blood undergoes changes from arterial, bright red color to venous of dark blue tint, and back again from venous to arterial; but we should understand clearly where these changes take place. It is not in the ordinary blood vessels which have thick walls, but in the network of capillaries—those small tubes with very thin walls that connect the arteries and veins. For example, the blood is rendered arterial in the capillaries of the lungs and venous in the capillaries of the tissues; also, all the exchanges spoken of above take place in the capillaries.

Blood is made up of a fluid plasma, in which float minute corpuscles. In higher animals there are two kinds, red and white. The red ones are much more numerous than the white (in the human body about 355 red corpuscles for one white). They are oxygen carriers and their color is due to the presence of the substance (hæmoglobin) which holds the oxygen. They have a regular life-history; they live a few weeks and break down, disappearing principally in the liver and the spleen. It follows, since they disappear, that they must be renewed, and new ones are being continually formed in the red marrow of bones. The white blood corpuscles are larger in size; they possess the power of changing form and creeping. They gather particles of foreign substance, and creep with them out of the blood vessels, and even to the surface of the body. They also feed upon bacteria, and help to rid the body of harmful kinds. The white blood corpuscles are, in a sense, eating cells. They are renewed from the spleen and the lymphatic glands. Physiologists now recognize several kinds of white blood corpuscles.

The clotting of blood prevents profuse bleeding. After a cut the blood tends to form a stringy fibrin in which the corpuscles get entangled and this forms a sort of plug to the smaller vessels and prevents further bleeding. The cut ends of larger blood vessels cannot be stopped in this way.

Bloodroot, a wild-flower belonging to the poppy family, of much beauty in the open but quickly perishing when plucked. It is sometimes called Indian Paint, also Red Puccoon. It gets its name from the orange-red juice that fills its thick rootstock. This juice, to be obtained from all parts of the plant and which stains the hands in picking, was highly valued by the Indian and the pioneer mother; the former borrowed it for his war paint, the latter dripped it on sugar and gave it as remedy in cases of colds. The Indians to-day use the juice to dye baskets, quills and moose hair, and use it, too, as a medicine. The white man also appreciates its medicinal properties. Bloodroot is widely distributed from Maine to Florida and west to Nebraska. The blossom grows on a naked stem, and there is a single, large round leaf, which encloses the bud, unfolds and grows with the flower. There are numerous stamens, offering much pollen to visiting insects. At night the blossom closes.

Bloomfield, N. J., a town in Essex County, on the Morris Canal, and on the Erie and the Lackawanna railway 11 miles northwest of Jersey City. Settled towards the close of the 17th century as a part of Newark County, it was separated in 1812 and incorporated a township, receiving its name in honor of Joseph Bloomfield, a revolutionary general officer, who was governor of New Jersey between the years 1803–12. It has a number of attractive suburban residences, together with several important manufacturing establishments, including electric elevators, railroad brake-shoes, paper mills, hat, silk and woolen cloth factories, rubber goods, boots and shoes, pins, organs, etc. It is the seat of the German Theological Seminary of Newark (Presb.), has several notable Presbyterian churches and those of other denominations, together with a Memorial Library, one or four banks and an attractive public park. Population, 25,000.

Bloomington, a city of Illinois, county seat of McLean County. It is a handsome city, with wide streets, well shaded, with fine residences and public buildings. It has good railroad facilities, four trunk lines and two interurban electric roads. It has a large wholesale trade and numerous manufacturing industries. Here is the Illinois Wesleyan University, which has a faculty of 40 and about 1,000 students. The public schools are of high grade, and there is a fine public library. Two miles distant. and connected by electric railway, is Normal, where are located the State Normal University and the State Soldiers' Home. Bloomington was the home of the late Ex-Vice-President Adlai Stevenson. Population, 37,000.

Bloomington, Ind., a city, the county seat of Monroe County, 51 miles southwest of Indianapolis, on the Chicago, Indianapolis & Louisville Railroad. It is the seat of the Indiana State University, with 75 instructors and 1,700 students. The city dates from about the year 1818, and is governed by a mayor and municipal council. Its chief industries embrace furniture, hub and spoke and leather-working factories, woolen mills and tanneries. There are extensive limestone quarries in the neighborhood of the city, which add to its industrial activities. The population is now 11,383.

Blouet (*blōō' ā'*), **Paul,** a French author, journalist, and lecturer, who wrote under the *nom de plume* of Max O'Rell, was born in Brittany, March 2, 1848, and educated in Paris. He took part in the Franco-Prussian war and was made prisoner at Sedan (Sept. 3, 1870); he afterward fought against the Commune, was wounded and pensioned. For a time he taught French at St. Paul's School, in London, and wrote his first work, which became instantly popular, *John Bull and His Island.* He subsequently published *John Bull's Daughters; Jacques Bonhomme;* and, after a lecturing visit to this country, he issued *Jonathan and His Continent.* He died May 24, 1903.

Blowing Machines, machines for producing artificial currents of compressed air, their uses being well-nigh as manifold as their forms, from the simple, early blacksmith's bellows to the modern rotary jet disk and fan blowers or exhausters of more or less ingenious mechanical types. Among the uses to which they are to-day put are, as contrivances for producing forced draught for boiler furnaces; warm or cool air in school rooms and crowded public buildings; to remove dust and refuse from the same or from factories and work rooms; to supplant vitiated air by pure air; and to furnish, by means of electric fans or the blowing engine, a drying current of air for grain or other substances, likely to spoil by being stored in crowded and heated elevators or warehouses. One of their chief and important uses is for supplying the airblast for Bessemer converters and blast-furnaces, by means of high-pressure steam-cylinders, which are frequently compounded.

For ventilation purposes the disk-blower is largely used and driven by an electric motor or by belting connected with an engine; other contrivances are what is known as the positive blower, such as the Root type, which exerts a higher pressure than the disk or fan blowers; also the steam jet blower, which creates induced currents of air on the principle of the injector, such as are used in locomotives and fire engines for creating a powerful draft.

Blow'pipe, a small instrument used for glass blowing and soldering metals, and also in chemistry to determine the nature of substances. By means of it a jet of air is thrown into a flame, causing the flame to burn with great rapidity, and increasing its effect by making it occupy a smaller space. The blow-pipe consists of a funnel-shaped tube of metal, about eight inches long, closed at the wider end and open at the upper end, which forms the mouthpiece. Near the lower end a small tube passes out, through which a fine current of air can be blown. When directed against a candle or gas jet, it makes the heat of the flame very intense, so that hard substances may be quickly melted.

Blücher (*blōō'ker*), **Gebhard von,** a distinguished Prussian general, was born at Rostock in 1742. In 1793 he fought against the French on the Rhine, and showed great genius as a cavalry leader. War with the French was renewed in 1806, and Blücher, as lieutenant-general, led the vanguard at the battle of Auestadt, and soon after was captured. He was, however, exchanged, and took a prominent part in the ensuing struggle with Napoleon. Together with the other powers allied against Napoleon, the Prussians, with Blücher as commander-in-chief, defeated the French conqueror at Leipsic in 1813. He was raised to the rank of field-marshal, and the next year led the Prussians against France. He was repeatedly defeated, but finally marched victoriously into Paris, when his king made him Prince of Wahlstadt. After Napoleon s return, in 1815, Blücher again took general command, and, though defeated at Ligny, his timely arrival at the field of Waterloo decided that great victory. He received new honors, and four years later died on his estate of Krieblowitz, in Silesia, September 12, 1819. He was called Marshal Forwards, and is still a great hero among the German people.

Blueberry, the term for a small fruit commonly applied in New England to a berry of the *Vaccinium* species. It is sometimes confounded with the bilberry or huckleberry, though it is of a distinct though allied class. See HUCKLEBERRY.

Bluebird, also called Blue Robin, an early spring bird of the United States, belonging to the thrush family. Some individuals pass the winter in sheltered places as far north as southern Connecticut. It appears very early in the spring, and in New England begins nesting in April. By the middle of the month about five bluish white eggs are laid. It is a little longer than the English sparrow, has feathers of a rich bright blue above and reddish chestnut on the throat and breast, and white below. The female is duller in color than the male. It is of a happy social disposition, and builds its nest in orchards and near houses, and will take advantage of a box, a deserted woodpecker's nest or a hole in a fence post. A pair raise from two to three broods a summer, at first the young birds being almost black. One of the first birds to come, they are one of the last to leave, remaining until the frost. of November.

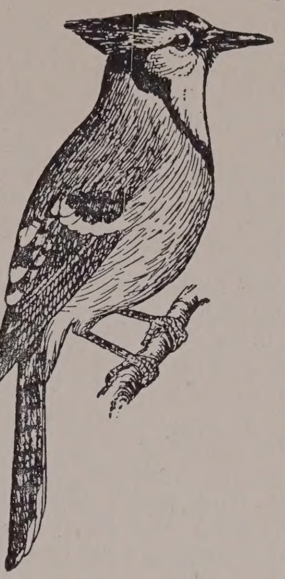
"Ah, now that you are gone, I know
The summer's gone!"

The voice is soft and musical, the temper of the bird most amiable. Its beauty and also its usefulness as an insect destroyer make it a very desirable neighbor; one whom it were well to invite close by building for it a tiny house.

Blue Books or **Parliamentary Papers.** are the official reports, returns and documents printed for the British government, and laid before the houses of Parliament for the use of members. They are uniformly stitched up in dark-blue paper wrappers (in France they are yellow; in Germany and Portugal they are white; in Spain red; and in Italy green); and are called from the color of their covers. Blue Books include, besides statistics of the home trade in England, consular reports from abroad; bills presented to and acts passed by parliament; reports of committees of both houses; and all papers and returns moved for by members or granted by government on particular subjects.

Blue' fish, a salt-water fish of blue color merging into greenish, widely distributed in temperate seas. Its ordinary size is from two to three feet, weighing four to ten pounds, but larger sizes are taken. It is highly prized as a table fish and also as a game fish. It is very destructive, and appears to eat nearly everything that swims. Bluefish go in large schools, like a pack of hungry wolves, killing fish not much inferior to themselves in size, and more than is required for their support.

Blue Jay (*Cyanocitta Aristata*). Of the jay family, birds that are common in the Old World, the American blue jay will be familiar to most bird lovers. It is smaller than its European kin, but, like its foreign cousin, it has a fine crest and a beautiful purple blue plumage, though its song is harsher, and it is a great depredator, and sometimes devours the eggs and young of other birds, especially after the breeding season. It is also a fighter, though its courage is not of a high order attacking owls and squirrels at times; while its food consists of anything it can obtain in winter, and in summer feeding on insects, nuts, seeds and fruits. It is found along the coast of North America from Newfoundland and the Canadian maritime provinces south to Florida and the Gulf, and inland as far as the plains. The long-tailed blue jay is an inhabitant of Central and South America.



BLUE JAY

Blue Laws, a name sometimes given to the early laws of the New England states, especially of the New Haven colony. The appellation probably came from the strictness and severity of the early rules of the Puritans. No such distinct system of laws as the blue laws, however, existed in New Haven.

Blue Ridge, the range of the Alleghenies which lies nearest to the Atlantic Ocean, and extends in a northeast and southwest direction through Pennsylvania, Maryland, Virginia, North Carolina and Georgia. The spur in Pennsylvania is called South Mountain. From the James River to the line of North Carolina the ridge is called the Allegheny Mountain.

Blue Warbler. See Blue Bird.

Boa, a name loosely applied to large serpents that crush their prey in coils of their bodies. The name properly belongs to the boa constrictor and the anaconda, both natives of tropical South America. The former lives in dry bushy regions and the latter in damp places; it is often called the water boa. The boa constrictor attains a length of twelve feet and upward, but the anaconda is much larger. It is difficult to get trustworthy measurements, but it is doubtful that it exceeds twenty feet in length. They are both to be distinguished from the pythons, which are residents of the tropical regions of the old world. The boas have no poison fangs, but their powers of crushing are great. They are able to swallow whole animals the size of a small dog, or, perhaps, even a goat. After feeding in this way, they remain torpid for several weeks to complete the process of digestion, and during this period they may be easily killed. See SNAKES.

Boadicea (*bŏ′ȧ-dĭ-sē′ȧ*), "the British warrior queen," was wife of the king of the Iceni, a tribe existing in the time of the Romans, living in the region now occupied by the English counties of Norfolk and Suffolk. At her husband's death, about 60 A. D., the Romans seized her land and treated her and her people cruelly. Boadicea, enraged, gathered a large army, captured several Roman colonies and destroyed as many as 70,000 Romans. She was in turn defeated with loss, and in despair killed herself by poison. The poets Cowper and Tennyson have told her story in verse.

Boar, the male of swine or, when applied to the wild stock of swine, used for either sex. Its native country is the Old World, where the wild stock abounds in parts of Europe, in Asia and in Africa. The domestic breeds of swine are all probably descendants of the wild stock. The wild boar is a large, powerful beast, measuring about four feet in length. Its color is dark brown. It comes from its place of concealment at night, feeding on roots, herbs, grubs etc. Boar-hunting has long been considered one of the most exciting sports of the chase It was once a favorite sport in England, and is still practiced in parts of Europe, India and Syria. In some places toils and nets are used; in others dogs, which bring the boar to bay, when he is killed with a spear or a knife. When at bay he is very dangerous, and will display remarkable courage and tenacity. The bristles are in demand for brushes.

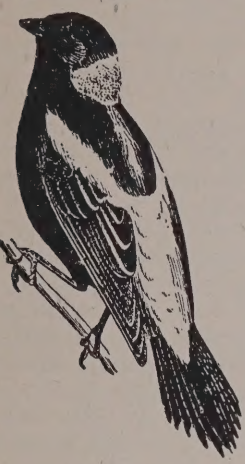
Board of Health. This name is given to the body which is created by the government of a city, or state or nation for the purpose of protecting the health of the people. A national board of health was set up by the U. S. government in 1879; but after four years it was discontinued, and its duties divided among other offices. But most of the states support their own boards of health A board was established as early as 1869 in Massachusetts, and the example was quickly followed. Large cities have city boards of health. Boards of health regulate the sale and preparation of foods and medicines; and they control the erection of buildings and all that concerns cleanliness and sanitation. They enforce needful precautions against infectious diseases and epidemics.

Board of Trade, an organization whose members more advantageously transact business together than separately. Generally it is an exchange where cotton, grain, produce or provisions are dealt in. It originated at Marseilles about 1600. The Chicago Board, founded in 1848, is the greatest grain market in the world. It has established a uniform system of inspection and grading. It expressly provides for actual delivery of everything bought and sold, even when transferred by margin deals. Business is transacted by making contracts. These require delivery at a specified date, and are known as futures. Part-payments, called margins, are made on the day of the deal, and consist of money or securities deposited with the broker to cover probable fluctuations in price, the broker providing the balance. Suppose a member buys 5,000 bushels of wheat. He deposits $250 as margin to cover five cents' possible decline in the price *per* bushel. Should the price advance the trader can sell, take the profit and withdraw his deposit. If the price decline, the trader deposits enough more to cover the decline, or sells, losing as much of his margin as the amount of the decline, the broker's commissions and the interest on the money the broker advanced. Trading on margins is the leading feature of boards of trade. Almost every exchange has a clearing-house or establishment where differences of accounts are adjusted. At the close of business, daily, all dealings are reported. Members who have lost money send certified checks for the amount, those who have made it receive payment. Though business on the floor is transacted with noise and seeming confusion, and is vast in volume, it is carried on with speed and ease. One of the means that bring these results about is the trader's use of a sign-language.

Board′man, George Dana, a Baptist American missionary, was born at Livermore, Maine, in 1810. In 1825 he went to Burma, and there threw himself into mission work, especially among the Karens, becoming practically founder of the Karen mission. Worn out by his labors, he died at the early age of 30 (Feb. 11, 1831), having accomplished what few men attain in a long life. He left seventy members of his mission church, and within a few years, by means of the seed he had sown, thousands of the Karens were converted.

Bobolink, a beautiful American bird. Passing the winter in S. America, it comes northward in the early spring, and breeds from New Jersey north to Nova Scotia and westward to Utah. Its length is about seven or eight inches, and its color varies with the season In the early summer the male is black, buff and white, while the female is sparrow-like in plumage. This bright coat the male changes in July and August for one like that of its mate, and journeying south, they are shot for the table under the name of reed-birds. The birds cease singing at the close of the nesting season In late autumn they appear in the cultivated fields of rice in South

Carolina and Georgia. They are here known as rice-birds, and do great damage to the rice crops.



BOBOLINK

From here they go to their distant winter quarters in the West Indies and South America. The Bobolink is known by many names, being called May bird, Meadow-bird, American Ortolan, Butter-bird and Skunk Black-bird. Unlike most birds, his black color is on the breast, above he is light, scarcely to be distinguished from the meadow-grass in which he makes his home. The nest upon the ground is built largely of this grass, with sometimes a few leaves. The eggs, three to seven in number, vary in size and color. Insects are their chief food. The Bobolink is a shy bird; seldom seen, but often heard, the song of the male is musical, rippling and jolly. John Burroughs calls him "the gladdest bird that sings and flies." . . .

"Bubbling throat and hovering flight
And jubilant heart as e'er was made."

Bob White, a very interesting and useful bird, distributed throughout the United States from Maine to Dakota and south to the Gulf. He is usually called quail, but belongs to a different family from the quail of the old world. He is a true friend to the farmer, making way with seeds of weeds and with destructive insects, eats the potato beetle and the moth responsible for the dreaded cut-worm. The male is 10 inches in length; above, wood-brown barred with black, near the tail mottled gray; front of head black; throat white; under part, whitish marked with black; above the eye on each side of the head a long line of white. His call is most characteristic, the loud, clear whistle a distinct "Bob White," "Bob White." It nests on the ground; in open fields, by roadside wall, and in scrubby places, the loose nest made of grass, leaves, weeds and straw. The numerous and conspicuous eggs are white, and as a rule vary in number from 10 to 18, though 25 have been known. Two or three broods are raised by one pair. The mating season begins early in May, but eggs are found from late May till late summer. "There are few prettier sights than a family of old quail with their young walking about fearlessly in a woodland meadow. The bird's domestic life is particularly interesting from the part the male plays in the family helping to build the nest, feeding his mate on the eggs, and, in case of her death, brooding in her place." (Dugmore). There is also a Florida Bob White, smaller and darker than the one to the north. As is well known, Bob White is a valued game bird, in the north called quail, in the south, partridge. See Dugmore: *Bird Homes;* Merriam: *Birds of Village and Field.*

Boccaccio (*bŏk-kä'chō*), **Giovanni,** an Italian novelist, was born either at Paris or at Florence in 1313. The early part of his life was spent at Naples, where he fell in love with a princess, whom, under the name of Fiammetta, he has made famous in his poems and stories. His most noted work is *The Decameron.* It opens with a description of the plague at Florence in 1348. A party of ladies and gentlemen who have left the city for rest, while away ten days (whence the name Decameron) in telling stories in a garden attached to a country villa. In all, a hundred tales are told. Boccaccio took the popular stories of the day and told them in a beautiful and classic Italian, which has placed him among the great romancers of Europe. Many later writers have drawn their plots from his stories. Later in life, Boccaccio gave up the gay life of society and devoted himself to business and study. He became acquainted with Petrarch, the great Italian poet, and they were for long close friends. Boccaccio died at Certaldo, Italy, in 1375.

Bodleian (*bŏd-lē'ăn*) **Library,** the public library of Oxford University, England, named after Sir Thomas Bodley, who gave to it many books and did much to build it up in the early part of the 17th century. Many other valuable collections have been added to it, and at present it is entitled to a copy of every book published in Great Britain. The library is especially rich in works connected with biblical literature and in materials for British history. It contains about 600,000 volumes and about 30,000 manuscripts.

Bœotia (*bē-ō'shĭ-ȧ*), one of the ancient divisions of Greece, lying between Attica and Megara on the south and Locris and Phocis on the north. Its area was about 1,120 square miles, a little smaller than Rhode Island. It was largely inclosed by mountains, and when its main river, the Cephissus, poured its swollen floods into Lake Copias in the spring, the plain for miles around became a lake. In the days of Alexander the Great a vast tunnel was cut in the rock for the discharge of the water, but this fell into ruin and the district remained marshy and unhealthful until it was drained in 1886. The fourteen greater cities of Bœotia formed the Bœotian League with Thebes at its head, and many famous battles were fought here. The people of this district fell behind the rest of the Greeks in culture, so that Bœotia became a general name for dullness; but the district, nevertheless, gave birth to the great general Epaminondas, to the poets Hesiod and Pindar, and to the historian Plutarch. Bœotia and Attica together now form a province in the kingdom of Greece, with an area of 2,472 square miles and a population of 407,063. See PLATÆA and THEBES.

Boerhaave (*bōr′häv* or *bōōr′hä-ve*), **Hermann,** the most famous physician of the 18th century, was born near Leyden in 1668. After a long and thorough course of study, he was appointed lecturer on the theory of medicine at the University of Leyden. He devoted himself to chemistry, mathematics and botany, and besides his work in his own line he was for a time engrossed by these studies. He published several works on medicine and a work on chemistry. He became known throughout Europe, and patients and students flocked to him from all countries. Peter the Great visited him and received instruction from him, and the story is told that a Chinese mandarin sent him a letter addressed "Boerhaave, celebrated physician, Europe." He was a brilliant lecturer, and his personal character was admirable. After his death, in 1738, the city of Leyden raised a monument to his memory in the church of St. Peter, inscribed "To the Health-giving Skill of Boerhaave."

Boers (*bōōrz*), meaning "farmers," is the name given to the Dutch colonists of South Africa, who are engaged in agriculture and cattle-raising. As early as the 17th century their first settlement was made at the Cape of Good Hope (1652), and they still have the old Dutch characteristics, especially the love of freedom, with an added energy and recklessness, although they have mixed to some extent with other races. The Cape was ceded to England in 1814, and in 1835 the Boers, not liking the new government, as it prohibited the holding of slaves, went northward in bands and occupied Natal, the Orange Free State and the Transvaal. Following the Boer War the former Boer possessions, together with Cape Colony, were made self-governing and later incorporated into the Union of South Africa, with Louis Botha, a prominent Boer general in the war, as premier.

Boer War (1899–1901). Dutch disaffection toward England's domination in South Africa long existed, and in the country there was always an atmosphere of hostility and at periods, of actual strife. Manifestations of racial resentment date back as far as the era of the closing rule of the Dutch East India Company, at the end of the 18th century and the occupation of the Cape by the British. Still more incensed became the Dutch population when England abolished slavery and sought to discipline the Boers, owing to their harsh treatment and enslavement of the Basutos and Griquas. This attitude of the dominant power led to the great "trek" in the thirties, when the stout Dutch burghers put the Orange River and, subsequently the Vaal, between them and the rule of Britain. Nor were racial antipathies in any way softened when, in consequence of the chronic native wars, England intervened in the affairs of the Transvaal and annexed their territory in 1877, though four years later (1881) she restored it to self-government, subject, however, to the suzerainty of the British crown. The convention of 1884 somewhat modified the terms of this restoration, the control which Britain desired to exercise leaving the South African Republic (which the Transvaal government was now officially named), free to form an alliance with their Dutch kin in the Orange Free State, but insisting upon the right to control the external affairs of the republic, if occasion arose to do so. England's object in insisting on this control over the external affairs of the Transvaal was influenced partly by her concern for the peace of the whole of South Africa, where she had many colonies, and partly by the determination to check the paramountcy of the Afrikander influence in the country. Nor was England uninfluenced by the fact that the British people, especially of the aggressive Tory type, bitterly resented the Gladstonian surrender of British interests in 1881, and were humiliated by the defeat of Sir George Colley by the Boers at Majuba Hill The incoming of a foreign element, chiefly of British nationality, in 1884, after gold was discovered in the Transvaal, added to the racial friction, and incited the Boers to treat them unjustly as citizens. This treatment of the newcomers, who were refused the rights of representation and indeed of liberty and free speech, led to the abortive attempt of some of the restless spirits of the British community to overthrow the Dutch government. This was the Jameson raid, which had its ignominious ending in the surrender at Doornkop on Jan. 2, 1895. The rising resulted only in increasing the oppression of the Outlanders, who now turned to the mother country for redress of their grievances, and forwarded to the crown a petition praying for rights which they claimed were in accordance with the conventions and treaties. This action brought about a conference held at Bloemfontein in May, 1899, between the British High Commissioner (Sir Alfred [now Lord] Milner) and President Kruger, which resulted adversely to Britain's demand of the franchise for her subjects. The following months were spent in diplomatic overtures, which were abruptly ended in the month of October (1899), when the Transvaal, with its ally, the Orange Free State, in an ultimatum, addressed to the British government, demand the withdrawal of the British forces from the Boer frontier and the recall of the reinforcements then on the way to Cape Colony. On England replying that the demand was such as "her majesty's government deemed it impossible to discuss," the Boers crossed the frontier in force (Oct. 11–13), and precipitated the war. The Boers are said to have had 75,000 men in the field.

The earliest actions, on the part of the Boers, were to lay siege to Mafeking, defended by Colonel Baden-Powell, and to shut up a small British force, commanded by Colonel Kekewich, in Kimberley, the famous seat of the diamond mines. Both of these towns lie on the western frontier of the Orange Free State and the Transvaal. At the same time Natal was invaded, and battles were fought at Elandslaagte, Nicholson's Nek and Farquhar's Farm. These resulted for the most part in favor of the Boers. At the beginning of November the siege of Ladysmith began, where some 10,000 British, under Sir George White, were for months held by about 20,000 Boers. Meanwhile the English army corps, under General Sir Redvers Buller, arrived in Natal, and advanced as far as the Tugela River, while other columns were formed in Cape Colony, designed to operate in the Orange Free State and to retake Colesburg and Stormberg, south of the Orange River, which had been taken possession of by the Boers. To recapture these towns, Generals French and Gatacre were assigned. Lord Methuen, who pressed forward to the relief of Kimberley, encountered the enemy at Belmont and at Eslin and Graspan, and after crossing the Modder River caused them to retire to Magersfontein. Here, however, he was defeated by the Boers, while Gatacre met with disaster at Stormberg, and Buller was repulsed at Colenso. These reverses brought Lord Roberts on the scene, in chief command, with large reinforcements, including Canadian and Australian volunteers and some irregular forces raised in Natal and Cape Colony. With Lord Roberts came Lord Kitchener as chief of his staff. By this time the British had, all told, about 90,000 men in the field, opposed to the Boer's total force, in the neighborhood of 60,000. Subsequently was added to the British strength a new division, the sixth, which was now ordered to be mobilized and forwarded to the Cape.

Early in January (1900) the Boers made a determined assault upon Ladysmith, which, though repulsed, entailed great loss to both sides. Later in the month occurred the sanguinary affair at Spion Kop, where the British, after carrying the position, were in turn driven back and forced to retreat beyond the Tugela, with a loss of some 2,000 men. A fresh advance was made on Feb. 5, as far as Vaal Krantz, but after three days' terrible fighting a new retreat was ordered. About this time a large British force, under General French, advanced to the relief of Kimberley, and the siege was raised Feb. 15, 1900. From this time the tide turned against the Boers. The British force, augmented to 200,000, under the able leadership of Lord Roberts, pressed forward on strategic lines, and the Boer armies, though fighting with obstinate valor, were forced to give way. After severe fighting at Koodersrand and Dreifontein, when the Boer army, under General Cronje, was beaten, General Roberts entered Bloemfontein, the capital of the Orange Free State, on Mar. 13, 1900. General Buller, after prolonged fighting, raised the siege of Ladysmith on Feb. 28, and relieved the long-beleaguered army of General White. A final and determined assault by the Boers upon Mafeking was repulsed, and on May 18 it was relieved by the British under Lord Roberts. The British now invaded the Transvaal, and, advancing, entered the great mining city of Johannesburg on May 31. President Kruger and his cabinet now fled from Pretoria, and General Roberts, after releasing 3,200 British prisoners at Waterval, entered and took possession of Pretoria June 5.

The Boer forces made no further determined stand against the British, but under the leadership of Generals Botha and De Wet, continued an active desultory warfare, cutting the lines of the enemy and attacking detached bodies of British troops with great bravery and varied success. Peace articles were signed May 31, 1902, by which the Boers made final surrender, and British supremacy was established. The loss to the British in the conduct of the war was more than 20,000, including killed in action and died of wounds and disease, besides more than 40,000 sent home as invalids, while the cost of the war to Britain alone from 1899 to 1903 was $937,000,000. The Boer total losses, beside 32,000 taken prisoners, included 3,700 killed or died of wounds. See Sir A. Conan Doyle's *The Great Boer War* (London, 1902).

Bogota (*bo'go-ta*), the capital of the Republic of Colombia or New Granada, stands on a tableland of 450 square miles in area, at an elevation of 8,694 feet above the sea and is surrounded by mountains. The city was founded by the Spaniards in 1538, and has a population of 150,000. Although the surrounding plain is fertile and the mountains abound in valuable minerals, such as iron, coal and salt, and probably the precious metals, yet as a rule the people are greatly impoverished in consequence of the difficulty of transportation across the mountains. There are at present few manufactures. The city teems with churches and possesses, besides a fine capitol and other official buildings, a mint, a university, a number of schools, a free library, observatory, two theaters and several museums. It also supports forty journals, so that its people claim for their city the title of the Athens of South America.

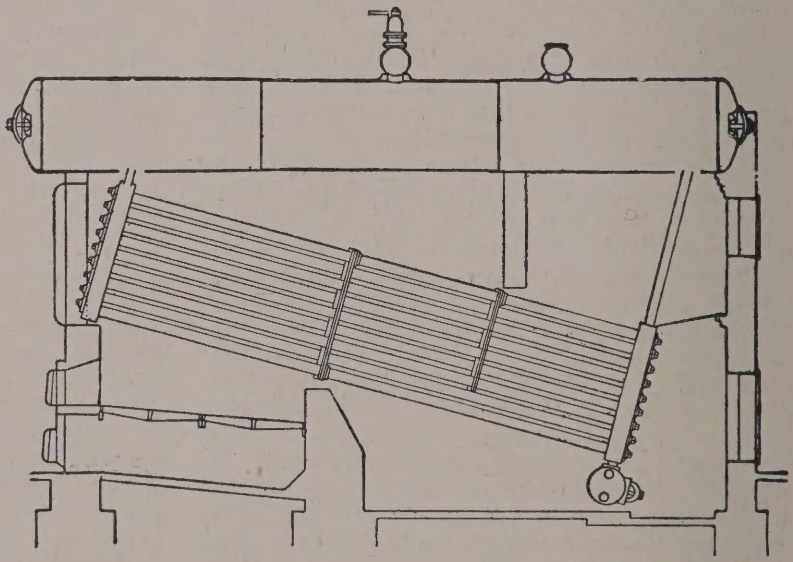
Bohe'mia, formerly a kingdom of Europe, then a province of Austria-Hungary, lastly part of the war-born Czecho-Slovak republic. It has an area of 20,060 square miles, or considerably less than West Virginia, and a population of 7,000,000. It contains nearly 400 cities, of which the largest is Prague, the capital and industrial center, with a population of 600,000. The country is enclosed on all sides by lofty mountains, which abound in mineral wealth, silver, tin, copper, iron, porcelain, clay, etc., while more coal is mined in the kingdom than in all the other provinces of the Austrian empire. The Elbe and its numerous branches water the soil, and grains and fruits are extensively raised. Its manufactures are important; dying and calico printing, linen making and flax spinning, glass works (which afford work to 27,000 persons) being among the principal industries. The Elbe and Moldau, an extensive canal, good roads and a system of railroads of nearly 3,000 miles in extent supply the means of carrying on a large transit trade. The people are mainly Czechs, Germans and Jews. Among them education is much more general than in any of the other ex-provinces of Austria. The University of Prague has over 3,000 students, and there are a large number of other schools.

The Czechs, a Slavic race, came into the country as early as the 5th century, A. D, driving out the earlier inhabitants. From that time Bohemia came under the power of various nations, and was at one time an elective kingdom; but in 1526 it became a part of Austria, and its history since that time has merged with that of Austria until 1918. There has been for some years a continual struggle between the Germans and the Czechs for supremacy. The Czech language is one of the most cultivated of the Slavonic dialects, and recently there has been a revival in its study as well as in Bohemian literature. The Allies recognized the independence of Czecho-Slovakia in 1918 even before the end of the war, and under the leadership of Prof. Thomas G. Masaryk, the first president, the new republic adopted a democratic constitution, with equal suffrage for men and women. The great religious reformers, John Huss and Jerome of Prague, were both Bohemians.

Boileau (*bwä'lō'*), **Nicholas,** a French poet and critic, was born at Paris in 1636, and after a thorough education took up writing as a profession. His first work was a satire, *Adieu of a Poet to the City of Paris.* He became a friend of Molière, La Fontaine and Racine, and was pensioned by the king. His *Art of Poetry* is considered very fine. He did much as a critic to purify and refine the French language, and has had a great influence on French literature. He was made a member of the French Academy. He died at Paris in 1711.

Boiler, an apparatus for generating steam by heating water. In its ordinary form it consists of the following parts: a furnace in which the fuel is burnt; a chimney or other means of producing a draught and of removing the products of combustion; a vessel containing the water, this vessel so arranged that the heat from the furnaces reaches the water; a steam space connected by pipes with the engine or other device in which the steam is used; a pump or injector for supplying the boiler with water; various devices for safety and convenience of operation, such as steam-gauge to indicate the pressure of the steam, a water-gauge to indicate the amount of water in the boiler and a safety valve to release the steam if it is beyond a safe pressure.

Boilers have various forms, depending upon the purposes and the conditions of their use. The object in each case is to produce with safety the greatest amount of steam at the least cost of fuel, of operation and of maintenance. In the earlier days pressures of only three or four pounds per square inch were used, but to-day 100 and 150 pounds are the common pressures for engines, and double these pressures can hardly be said to be uncommon. These higher pressures demand increased strength in the construction of the boilers. A few years ago cast and wrought iron were much used, but only steel is used in the best boilers today. The cylindrical form is universally used, as that is the strongest and most convenient form to stand internal pressure.


BABCOCK AND WILCOX BOILER

Boilers may be divided into two general types: (1) those in which the furnace and heating flues are inside the water-vessel and (2) those in which the furnace is external to the water vessel. The first type is not much used in this country for stationary boilers, but it is commonly used for locomotive and marine boilers. The locomotive boiler consists of a fire-box of rectangular form which is more or less surrounded by the long cylindrical water-vessel. A large number of tubes run from the fire-box to the smokestack through the water-vessel, and thus allow the heat from the hot furnace gases to reach the water. The common stationary boiler in this country belongs to the second class. In its simplest form it is a single cylindrical vessel placed over the furnace and its hot flues. As more commonly used now, it consists of a large number of water tubes, the furnace gases passing around these tubes and thus heating the water. The Babcock and Wilcox boiler is one of the best of this type. The water is contained in a large number of straight tubes which are inclined at an angle of about 15° from the horizontal and connected with a drum above, which contains part of the water and the steam. The furnace is below the tubes, and the hot gases pass up and along the water tubes. These are compact, efficient and safe, if properly constructed. When the tubes are straight, they have the great additional advantage of being easily inspected and cleaned.

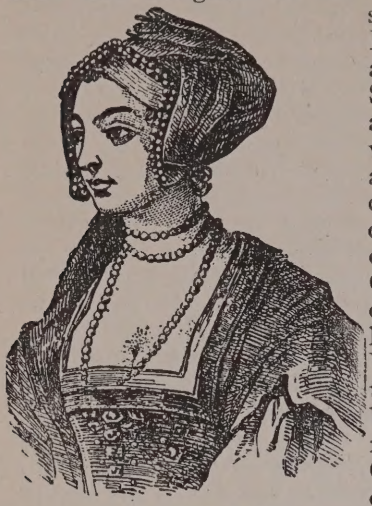
Boilers are generally rated in horsepower, and as applied to boilers this is a conventional term. A boiler of 1 H. P. is one which evaporates 30 pounds of water per hour from feed-water of 100° F. into steam at 70 pounds gauge pressure.

Boiling-Point, the temperature at which a liquid is transformed into vapor. The boiling-point varies with different liquids, while it changes with the amount of atmospheric pressure to which it may be exposed. When the boiling-point is normal at the sea-level, in high altitudes, where the air-pressure is light, liquids boil more slowly. So well-known is this that the heights of mountains are approximately measured by ascertaining the degree of temperature at which water boils. In highly elevated regions many substances cannot be cooked by boiling. A further fact is that when water contains foreign substances in solution the boiling-point is raised; in other words, the greater the amount of these substances a liquid contains, the higher within certain limits is the boiling-point of the liquid. Under normal atmospheric pressure, ether boils at 35° C., pure alcohol at 78°, while aniline boils at 183° C. Water boils at 100° Centigrade or 212° Fahrenheit.

Boise (*boi'zȧ*), **Idaho,** the capital of the state, and the county seat of Ada County, on the Boise River, about 48 miles east of its junction with the Snake River. It is reached by the Oregon Short Line Railroad (now part of the Union Pacific system). It lies in an important mining district and besides a military post it has a federal assay office, U. S. Court and land offices, together with a soldier's home, a penitentiary and the state capitol. Its civic institutions, besides the city hall, include a public library, several schools and academies, a business college and a natatorium. The Boise River is utilized considerably in the region for irrigation purposes, as well as for water power for the city's manufactures. The latter embrace saw mills, wood-working factories, foundries and machine shops. In the vicinity there is much farming carried on, as well as stock-raising, while Boise has become noted as a wool market. The $5,000,000 Arrowrock dam, highest in the world (348 feet), at Boise is one of the wonders of the world. Population, 25,000.

Bok, Edward W., editor, born at Helder, Netherlands, Oct. 9, 1863. He came to America a poor immigrant boy, aged six, and attended the Brooklyn public schools. For a time he was in the employ of the Henry Holt & Co., and Charles Scribner's Sons, book publishers. Editor-in-chief *Ladies' Home Journal* 1889–1919. Among his books are *The Americanization of Edward Bok*, and *A Man from Maine*. He is vice president the Curtis Publishing Co., and active in furthering peace plans among nations.

Bokhara (*bō-kä'rȧ*), meaning "treasury of sciences," a city of central Asia, the capital of the khanate or province of Bokhara, a vassal state of Russia, is situated on a plain near the River Zerafshan. It is more than eight miles in circumference, and is surrounded by mud walls twenty-four feet high, pierced by eleven gates. The palace of the khan, built on a hill at an elevation of 300 feet in the center of the city, is surrounded by a brick wall nearly seventy feet high. Bokhara is the center of religious life in central Asia, and is said to have 365 mosques. The finest occupies a square of 300 feet, and has a cupola 100 feet in height. Joined to it is a tower of about twice the height, from which criminals are hurled. The city has long been noted as a seat of learning, and besides a vast number of schools has about eighty colleges. The River Zerafshan is utilized for irrigating, and the drain of water is said to have lessened the population by one half, but there are still about 75,000 people. Silks, woolens and swords are manufactured, slave markets are held, and the bazaars are rich with the wares of Europe and Asia. The Transcaspian railroad opens communication with the ports of the Caspian Sea, but the trade is almost wholly in Russian hands. The area of the state of Bokhara is about 80,000 square miles, with a population of about 1,250,000.



ANNE BOLEYN

Boleyn, Anne (*bo͝ol′ĕn*), queen of England and daughter of Sir Thomas Boleyn, subsequently Earl of Wiltshire and Ormond. She was born about 1507 and was brought up at the French court. She became maid of honor to Queen Catherine of England. The king, Henry VIII, was attracted by her beauty, had his marriage with Catherine declared void, and was married privately to Anne. She soon lost his favor, and on a charge of unfaithfulness was tried, condemned, and beheaded May 19, 1536. She was the mother of Queen Elizabeth.

Bolingbroke (*bŏl′in-bro͝ok*), **Henry St. John, Viscount,** called the Alcibiades of his time, was one of the most gifted of English statesmen and orators. He was born at Battersea, near London, in 1678. He entered political life about the beginning of the reign of Queen Anne, on the side of the Tories, and by his abilities and eloquence soon became prominent. He was secretary of war and foreign secretary, and negotiated the Treaty of Utrecht in 1713. When George I came to the throne in 1714, Bolingbroke, who favored the Stuarts, fled to France. Some years later he returned to England and became associated with Swift and Pope and other men of letters. He tried in vain to get back into politics, and then spent another period of years in France, and died at the place of his birth in 1751. Besides his political writings, he wrote *Letters on the Study of History*, and the method here outlined is said to have been followed by Macaulay.

Bolivar, Simon, called the Liberator, was born at Carácas in what is now Venezuela, July 24, 1783. He studied law at Madrid, and traveled extensively, witnessing in Paris the closing scenes of the Revolution. After a visit to the United States, he returned to Carácas, determined to free his country from the yoke of Spain. Venezuela made her declaration of independence July 5, 1811, and the war began. Bolivar was soon forced to flee, but in 1812 he joined the insurgents in New Granada, and within a few months was able to enter Carácas as a conqueror, and proclaimed himself dictator of western Venezuela. But fortune now deserted him, and after a severe defeat he fled to Jamaica, where a hired assassin tracked his steps, but by mistake murdered his secretary. Gathering the insurgents at Hayti, he landed twice in Venezuela, and after defeating the Spaniards a number of times, a congress was opened at Angostura in 1819 and Bolivar was chosen president. Leading his army across the almost impassable Cordilleras into New Granada, a series of brilliant victories ended in the union of New Granada and Venezuela under the name of Colombia, and Bolivar was chosen president, Aug. 30, 1821. In 1822 he led an army into Peru, which he freed from the Spaniards. He became dictator of Peru in 1823, and made a tour through that country, in which he was received with enthusiasm. In his honor the southern part of Peru was named Bolivia and made a separate state, of which he was elected president. In 1826 he went back to Venezuela to quell a disturbance, and against his will was re-elected president. Many, in the meantime, had become jealous of his power; and when Venezuela separated from Colombia, in 1829, Bolivar in consequence laid down his authority. The congress of Bogotá, now largely made up of his enemies, however, voted him a pension of $3,000 on condition of his residing abroad. He died at San Pedro, Dec. 17, 1830. In 1842 his remains were removed to Carácas, where a monument has been raised to his memory. Statues have also been raised at Lima, at Bogotá and at New York, and his hundredth birthday was celebrated at Carácas in 1883, with exercises lasting over forty days, when sixteen foreign states were represented. Bolivar has been called the Washington of South America.

Boliv′ia. A republic on the west side of South America, having Brazil on the north, Brazil and Paraguay on the east, the Argentine Republic on the south and Chile on the west. Its area is 708,195 square miles, and its population is estimated at 3,500,000. It is eleven times as large as Illinois, and its population is much less than that of Chicago.

Surface. The western part of Bolivia is mountainous, containing some of the highest peaks of the Andean range. Among these are Illampu 22,500 feet, Illimani 22,500 feet. On the last named is Lake Illimani at an altitude of 15,950 feet above the sea. In this region is the lofty plateau of Oruro, with an average elevation of 13,000 feet, a length of 500 miles and a width of 100 miles. In the northern part are rich tropical valleys. The eastern section is level and heavily timbered. The great Lake Titicaca on the western border, with an area of 3,200 square miles and a depth of 120 fathoms, makes the northern plateau fertile. One of the islands in this lake was the home of the Incas or early rulers of Peru.

Rivers and Railways. The rivers of Bolivia feed the Amazon and La Plata. The Jurna and the Purus flow from Peru through Bolivia into Brazil on their way to the

Amazon. The most important rivers of Bolivia are the Bern and the Mamon, which with their tributaries drain the eastern section of the country and at the Brazilian boundary join to form the Madeira. Bolivia is poorly supplied with railways. A line runs from La Paz, the capital, west 56 miles to Ynaquai on Lake Titicaca, and an extension to Puno, Peru, which will give connection with the Peruvian port of Utollendo is projected. There is a railway from Oruro southwest 303 miles to Ollague, where connection is made with the Chilean railway to the port of Antofagasta.

Climate and Resources. Although lying entirely within the tropics, the varied elevation results in a wide range of climate and production, from the cold regions over 11,000 feet high, where crops are scant, through the temperate regions in the upper portions of the descending valley, which grow large supplies of grain, to the rich plains under 5,000 feet, which abound in all the wealth of tropical vegetation, including cotton, coffee, rice, cocoa, pineapples, bananas, tobacco and cinchona. Varieties of animals are found, among them the guanaco, llama, alapaca, jaguar, tapir, etc. In Bolivia, June, July and August are the winter months, December, January and February the summer months. The wet season extends from December to May.

Minerals. The mines of Bolivia have long been famous, especially those of silver, which yield annually about $10,000,000 and have yielded up to the present time over $3,000,000,000. Gold, copper and tin are mined to some extent. But while the mineral resources of Bolivia are exceedingly rich, including silver, gold, tin, copper, bismuth, iron ore, lead, marble, asphaltum, nitrate, anthracite coal and salt, yet the development of these resources has been greatly hindered by lack of transportation facilities. The decline in the price of silver, with the high cost of transportation, has led to the abandonment of many of the less productive mines. The manufactures of Bolivia are unimportant; no goods are made for export.

Cities. The chief cities of Bolivia are La Paz, the capital and the most important commercial city, population 78,856; Cochabamba, population 24,512; Potosi, population 23,450; Sucre, population 23,416; Santa Cruz, population 20,535; Oruro, population 20,670; Huanchaca, population 10,000.

Government. The form of government is much like that of the United States, with a president, two vice-presidents, a cabinet and two houses of Congress. The presidential term of four years is rarely observed, and for some years the history of Bolivia has been a record of military insurrections, the supreme power being held by successful generals. There are eight departments and one territory, the government of each being under national control.

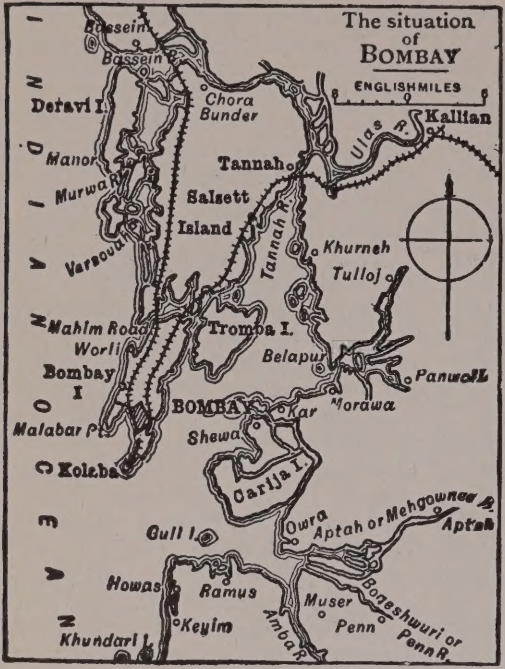
History. Bolivia came under Spanish rule in 1538; settlement began in 1578. Independence was declared in 1825 and the state was named in honor of the great liberator, Simon Bolivar. Its later history has been marked by insurrection and war. A war with Chile in 1879-83, although she was allied with Peru, ended in the loss of her coast district, including her rich deposits of nitrates. Her boundary disputes with Brazil and Peru were settled in 1903-04. The constitution of the republic was adopted in 1880.

Bologna (*bō-lōn′yä*), one of the most ancient cities of Italy, lies on a fertile plain at the foot of the Apennines, eighty-two miles north of Florence. The population is about 172,639. A high brick wall, with twelve gates, five or six miles in extent, surrounds the city; a canal flows through it, and the Rivers Reno and Savena flow past its walls. Many fine palaces adorn the town, rich in fresco-paintings by the great masters; but the most striking feature is the number of churches, there being over one hundred, beautiful in architecture and filled with treasures of art. Among them are San Stephano, rich in relics of the 11th and 12th centuries; San Petronio, the largest church in the city; San Domenico, where the founder of that order lived and died and where his tomb has been richly ornamented by Michael Angelo; and the cathedral dedicated to St. Peter. Two leaning towers stand in the middle of the city. Here also is the famous University of Bologna, founded in 1200, the oldest in Europe. In the 13th century there were said to be 10,000 students. There are also an academy of music and one of arts, abounding in works of native artists.

Bolsheviki. A name assumed by the radical section of the Russian Socialists who, following the downfall of Kerensky (*q. v.*) and the election of Lenine (*q. v.*) as premier, inaugurated a reign of terror which was characterized by wholesale murder and pillage and the confiscation of the property of the well-to-do. The name means "majority faction" while the smaller and more moderate Socialists were called "Mensheviki" or "Minimalists," meaning "the minority."

Bolton or **Bolton=Le=Moors,** a city of England in southern Lancashire, not far from Manchester, divided by the River Croal into Great and Little Bolton. It has long been celebrated as a manufacturing town, even as far back as the time of Henry VIII. Its cotton manufactures are especially important, there being more than 100 cotton mills, with about 4,000,000 spindles. There are also foundries and iron works, paper mills and dye works. It is an important railroad center. In the *Bolton Evening News* this city was the birthplace of the daily evening press. It sends two members to Parliament. Population, 168,215.

Bombay (*bŏm-bā′*), an important city of British India, occupies the entire breadth of the southeast end of Bombay Island or peninsula and bordering on the harbor within and on Back Bay without. Its harbor is one of the finest in the world, having a space, which is used for shipping, eleven miles long by four broad. Among the cities of India it is the most European in appearance. Besides the business blocks and the suburban homes of many of the European residents, there are on the esplanade facing Back Bay, the university, senate hall, high court, offices of public works and a sailors' home; while east of Back Bay, near the fort, are the town hall, mint, cathedral and custom-house. The terminus of the Great Indian Peninsular Railway is the finest building in Bombay. Bombay is also the terminus of the Baroda Railway. An extensive system of wharves and docks provides for its enormous foreign trade, which now surpasses that of Calcutta. Wheat, shawls, opium, coffee, pepper, ivory and gems are the products exported. There are sixty large steam mills, while added to the chief industries are dyeing, tanning and working in metals. The island was owned by the Portuguese in the 16th century and was ceded to England in 1661 as part of the dowry of Catherine, bride of Charles II. The population is 972,892. The British presidency of Bombay has an area of 123,064 square miles, with a population of 18,559,561, including Sind and Aden.



Bonaparte, Charles Joseph, lawyer and reformer, was born in Baltimore, June 9, 1861. He is the grandson of Jerome Bonaparte, King of Westphalia, whose romantic marriage to Elizabeth Patterson was practically annulled by Napoleon. Mr. Bonaparte was admitted to the bar in 1874, and soon became prominent as a political reformer. He was chairman of the council of the National Civil Reform League and president of the National Municipal League. He was a member of the Board of Indian Commissioners, 1902-04; Secretary of the Navy, July, 1905-December, 1906; and from December 17, 1906, to March 5, 1909, was attorney-general of the United States.

Bonaparte, Elizabeth Patterson, the first wife of Jerome Bonapart, was born at Baltimore, Md., Feb. 6, 1785, and died there April 4, 1879. As Napoleon I refused for reasons of state to recognize the marriage with his brother Jerome, which had taken place in December, 1803, and prevented the lady from landing in France, when she accompanied her husband to Europe, Mme. Jerome Bonaparte was compelled to seek an asylum in England, during which, at the instigation of the great emperor, she was divorced from Jerome and afterward returned to the United States.

Bonaparte, Jerome, youngest brother of Napoleon I and at one time king of Westphalia, was born at Ajaccio in November, 1784, and died near Paris in June, 1860. Early in life he became a midshipman in the French navy, and in 1801, when on an expedition to the West Indies, his ship was chased by English cruisers and Jerome Bonaparte had to take refuge in New York. Toward the close of 1803, while still sojourning in America and not yet twenty, he married Elizabeth Patterson, daughter of the president of a Baltimore bank, a marriage which his brother, the emperor, refused, however, to recognize, and it was declared null and void. In 1807 his brother created him king of Westphalia, and he then married Catherine Sophia, princess of Württemberg. The battle of Leipsic (October, 1813), which virtually secured the liberation of Germany, cost Jerome his kingdom and made him an European wanderer until the advent of his nephew, Louis Napoleon. After the *coup d' état*, Napoleon III made him a marshal of France president of the senate and governor-general of *Les Invalides.*

Bonaparte, Joseph, King of Spain, member of a famous family and eldest brother of Napoleon, was born at Corte, in Corsica, in 1768. He proved his ability in a number of important offices, among other services negotiating a treaty of friendship with the United States in 1800. After the coronation of Napoleon, Joseph was made commander-in-chief of the army of Naples, then ruler of the two Sicilies and in 1806 king of Naples. Two years later he was transferred to the throne of Spain, but found himself unable to suppress the Spanish insurgents, and after the defeat of the French, in 1813, returned to France. After the battle of Waterloo, he came to America, became a citizen of Bordentown, N. J., and followed the pursuit of agriculture. He returned to

Europe in 1832, and died at Florence in 1844. He was the only one of the Bonaparte brothers for whom Napoleon professed to care anything, though he was too humane in his ideas of government for his imperious brother.

Bonaparte, Louis (1778-1846), one time King of Holland, father of Napoleon III and brother of Napoleon I, his other brothers being Lucien, Joseph and Jerome. All were sons, together with four daughters, of Charles or Carlo Bonaparte of Corsica and his wife Letitia, the latter a patrician lady of strong-minded and accomplished characteristics. Born at Ajaccio, he was educated at the artillery school at Chalons, and early entering the French army he took part in his famous brother's successes over the Austrians at Arcola and Rivoli, in 1796-97. Under pressure from Napoleon I he married in 1802 Hortense de Beauharnais, but in consequence of incompatibility they separated five years later; while Prince Louis became King of Holland in 1806, though declining to sacrifice Dutch interests to his brother's imperial designs, and he abdicated in 1810 and retired to Italy. Meanwhile, Holland was annexed to France, but remained French for only three years, when the latter were expelled and the *House of Orange* was restored. Louis's separated wife, Hortense, was a rather notable authoress in her day, as well as a song writer, being the author of the one-time French national air, *Partant pour les Syrie*. Her third and putative son was Napoleon III; she died in 1837. Louis Bonaparte is also known as a writer of some note, among his works being a *History* (in French) *of the English Parliament* and a collection of *Documents on the Government of Holland*. In later years he became an invalid, and after the escape of his son, Louis Napoleon, from Ham, he removed to Leghorn, Tuscany, where he died.

Bonaparte. Lucien, Prince of Canino, and brother of Napoleon, was born at Ajaccio in 1775. He was well educated and filled a number of important offices. He was president of the Council of Five Hundred when Napoleon entered Paris, and by his energy greatly distinguished himself. As minister of the interior, he encouraged education, art and science, and as ambassador to Madrid he performed valuable services. He was a republican in belief, and opposed the absolute rule of his brother and refused the thrones of Italy and of Spain. The pope made him prince of Canino and Musignano. In 1810 he sailed for America, but was captured by the British. He alone showed presence of mind after the defeat of Waterloo. In later life he resided near Rome, and died at Viterbo in 1840. He had a good deal of talent, and was fond of science and the arts.

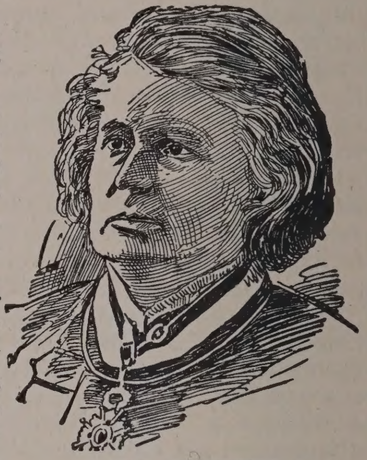
Bonaparte, Napoleon. See NAPOLEON I and NAPOLEON III.

Bond, an obligation, is a written instrument, signed and sealed, in which one party to the negotiation—the borrower, styled the obliger—agrees to pay money to another, the obligee, generally on certain precisely defined and set forth conditions, and at a definite period. The amount of the liability to be incurred upon a breach of the conditions in the bond is usually set forth in the instrument, and in the case of default or failure to fulfill the terms and conditions of the instrument, the bond is said to be forfeit, and suit can be instituted for recovery, and that commonly with penalty, or claim for damages added. A bond, in other words, sets forth (1) an engagement to pay money in return for certain privileges granted or payments made, and (2) the conditions on which the engagement to pay back will become good and operative, or, otherwise, void and inoperative. When the bond is given for the performance of an act, recovery can be sued for in court for non-performance of the act, *plus* an amount in the way of damages to the obligee for what loss or losses he may have sustained in consequence of such non-performance. A bond may be made either by or to a single individual or by certain parties jointly to other interested parties, jointly and severally stated. In some cases, moreover, with the bond is handed over to the obligee some security, or it may be a mortgage, upon the property and effects of the debtor or obligor. Bonds can be made and are often issued by corporations, which in the interests of their trusts or concerns have to borrow money to exploit and advance them; and in default of meeting and satisfying these bonds at maturity the corporations can be proceeded against, sued and recovered from, as such in the courts. Governments, national and state, as well as cities and towns, are often at times under the necessity to issue bonds as negotiable security for considerations named or money loaned them; similarly, when in default, such can be sued and recovered from, just as in the case of private individuals or corporations. The bonds of single individuals, as well as bonds jointly made, commonly bind their maker's heirs, executors and administrators, in the instruments conveyed, and in the last resort these latter can be proceeded against as in the case of the primary and single defaulter.

Bond, Sir Robert. The Right Honorable Sir Robert Bond, **P. C., K. C. M. G.,** LL.D., was Premier and Colonial Secretary of the Colony of Newfoundland from 1900 to 1909. He entered the Legislature in 1882, and was elected Speaker of the House of Assembly in Newfoundland in 1884, and became Colonial Secretary with a seat in the cabinet in 1889. He was authorized by the Home Government to assist Lord Pauncefoote in 1890 in negotiating a reciprocity treaty with the United States, and was instrumental in carrying through the Bond-Blaine convention. In 1892 he was a delegate to Canada on the North American fishery question. In the great financial crisis which overtook Newfoundland in 1894 his strong action and able championship of the cause of the colony in financial circles in London preserved the autonomy of the colony, and established a claim on Newfoundlanders of personal loyalty towards him which has steadily strengthened. In 1895 he was chairman of the delegation that proceeded to Canada on the question of confederation. In 1900 he was specially invited by H M Government to attend a conference at the Colonial Office on the French Treaties Question In 1902 he was a member of the conference of colonial prime ministers held in London In the same year he was authorized by H. M. Government to negotiate a treaty of reciprocity with the United States on behalf of the Colony of Newfoundland, and succeeded in negotiating the Hay-Bond treaty In 1904 he was invited by H. M. Government to assist in drafting regulations for the carrying out of the Anglo-French convention. He represented Newfoundland at the Imperial Conference in 1907.

Bone is the hard material of the skeleton of most animals. The office of bones is to furnish a building-structure or framework for the body, to support the soft parts, and protect delicate organs from injury, and by means of joints, to form a series of levers. Bone is white in color. but in the living body has also a pink and bluish tint. It is elastic and very tough, twice as strong as oak. Arab children are said to make good bows of the ribs of camels. Bone is made up of two parts, an earthy substance and an animal substance. By long burning the animal matter may be got rid of and the rest falls apart in a powder. By soaking in an acid the earthy salts, as they are called, may be dissolved out, leaving a tough and bending substance. Bones are of three shapes: long, as the armbone; flat, as the shoulder blade; and short and irregular, as those of the wrist. The bony substance is also formed into compact and spongy bone, the compact or dense forming a shell around the spongy or loose texture. The spongy texture is made up of numerous bars which unite together in the form of a lattice-work, light, but very strong. The compact texture is also full of holes, which are so small that they can be examined only by a microscope. These holes are the mouths of canals, which form a complete network of tubes, containing blood vessels which supply the bone with nourishment For bones grow and must be kept alive like other tissues of the body; they start as a mass of cells. and only become true bones after a long process Bone is also covered outside with a coating of membrane, in which blood vessels and nerves branch in all directions and join the interior net-work. The shaft of long bones is hollow; in some birds and other animals this space is filled with air, but in animals like man it is filled with a matter called marrow This shaft is also lined with a membrane pierced with vessels. Besides all the small blood vessels that have been named, there is also a larger one which runs diagonally into the center of the bone Bone is useful in medicine and cooking and in many other ways. (See SKELETON etc.)

Bonheur (bŏ'nẽr'), **Rosalie,** a celebrated French animal painter, was born at Bordeaux in 1822 She made a study of animal life and in that department achieved great distinction. *Ploughing with Oxen, Ploughing in Nivernais* and *Horses in a Meadow* are among her well-known paintings. The *Horse Fair* was bought for over $50,000 by Mr. C. Vanderbilt and placed in the Metropolitan Museum of Art at New York. She long directed a school of design for girls. She received several medals also the decoration of the Legion of Honor. During the siege of Paris her studio and residence at Fontainebleau were spared and respected by special order of the then crown prince of Prussia. She died May 25, 1899.


ROSA BONHEUR

Bon'iface, the name of nine popes, most of whom are of no historic importance. Boniface VIII, a native of Anagni, was elected pope in 1294 He was inaugurated with great pomp, the kings of Hungary and Sicily holding the reins of his horse, and, with their crowns upon their heads, serving him at table. He failed in many of his attempts to assert the papal power in temporal affairs, and was made prisoner at Anagni by Philip the Fair of France. He was freed by the people of Anagni, and died at Rome soon afterward in 1303. He is mentioned by Dante in *The Inferno.*

Bon'iface, Saint, "The Apostle of Germany," was born in England about A. D. 680. Becoming a priest when thirty years old, he was sent by the pope to preach the Gospel to all the tribes of Germany, who as yet were pagans. Traveling through the country, he baptized multitudes and changed their idolatrous groves into churches. He was made a bishop, then archbishop and finally papal legate of all Germany. He founded churches and convents, and, scattering English priests, monks and nuns throughout the land, established many of the bishoprics which still exist. While working among the Frisians, an armed band of heathen fell upon him and killed him, with the converts who were with him (755). His remains were buried in the abbey at Fulda, which he had founded, and where there is still shown a copy of the Gospels written by him, with a leaf stained by his blood.

Bonn, a city of Rhenish Prussia, lying on the left bank of the Rhine. It is chiefly famed for its university. This great institution has about 185 professors and lecturers and 3,275 students, a library of 250,000 volumes, a splendid laboratory, an art museum, an observatory, a botanic garden and various other valuable collections. There is also a celebrated agricultural academy. Among the famous professors of the university were the great historian Niebuhr and the philosopher Schlegel. Niebuhr, Bunsen and Schumann lie buried in the minster of Bonn, which is said to have been founded by the Empress Helena in 320; and near it is a monument to Beethoven. Population about 87,967.

Bonython, Sir John Langdon, editor and proprietor of the Adelaide *Advertiser*, was born in London, Oct. 15, 1848, and educated at the Brougham School in Adelaide. He is also the owner of the Adelaide *Chronicle* and the *Evening Express*. He holds many positions of distinction in connection with educational institutions and was elected as representative of the state of South Australia to the first parliament of the Commonwealth.

Book (Saxon *boc*, meaning *beech*). In early times many different things were used as the materials of writing. The Babylonians and Assyrians preserved their writings either on papyrus, made of reeds, which grow in warm countries, or more commonly on brick clay, baked into square or cylindrical shapes. The Egyptians used papyrus (see PAPER) as early as 2000 B. C., and its use spread to Greece and Rome. It was rolled up on a stick, forming what is now called in Latin a *volumen* (roll), from which we get our word volume. One of these rolls has been found forty yards in length. Later on, carefully prepared skins or parchment became more common; while the Romans used a flat wooden board or sheet of metal covered with wax, upon which they scratched with a sharp pointed instrument called a stylus. In the middle ages, when books were written by hand on parchment and later on paper, four, five or six sheets were commonly used, folded in the middle, making twice as many leaves. When printing was introduced, the same plan was at first used, only one page being printed at a time. It later became common to print several pages at once, the paper being folded and cut into pages afterward; the number of times it had to be folded showing the size the book was to be. Even to-day the same words are used to describe the size of a book; one where sheets are folded once down the middle, making two leaves, being called a folio; if the sheets are folded twice, making four leaves, it is called a quarto, etc. But as the size of the original sheet now varies considerably, these terms do not tell accurately the size of the book. Books vary in size from the *Thumb Bible*, which is a little larger than a postage stamp, to certain church books which are described as six feet high and four feet broad. Titles of books used to be very long, sometimes covering nearly the whole title-page; and the preface and dedication were formerly much more elaborate than now. Illustrations have been used in books for a long time. When books were written on parchment by hand, the ornamenting of the margins and the lettering were often very elaborate.

BOOK BINDING before the days of printing and for a long time after was done by hand, the cover usually being made out of prepared skin and often ornamented with gold and jewels. At the present day books are usually sent to the binder as unfolded sheets of thirty-two pages each, the pages being already numbered. The folding is usually done by a machine, though sometimes by hand. One from each bundle of folded sheets is taken and they are laid together according to the number of the sheets, then pressed solidly together in a machine and sewed. After this the edges are cut and the book rounded on the back to make projections or joints to hold the cover firm. The cover has already been prepared by pasting a special kind of cloth over two pieces of pasteboard, keeping them as far apart as the width of the book, and by stamping the ornamental design on the outside. The outside paper of the book, together with the threads on which it is sewed, is then pasted to the inside of the covers and the book is put into a hydraulic press until it is dry. The binding of books in leather is a slightly different process.

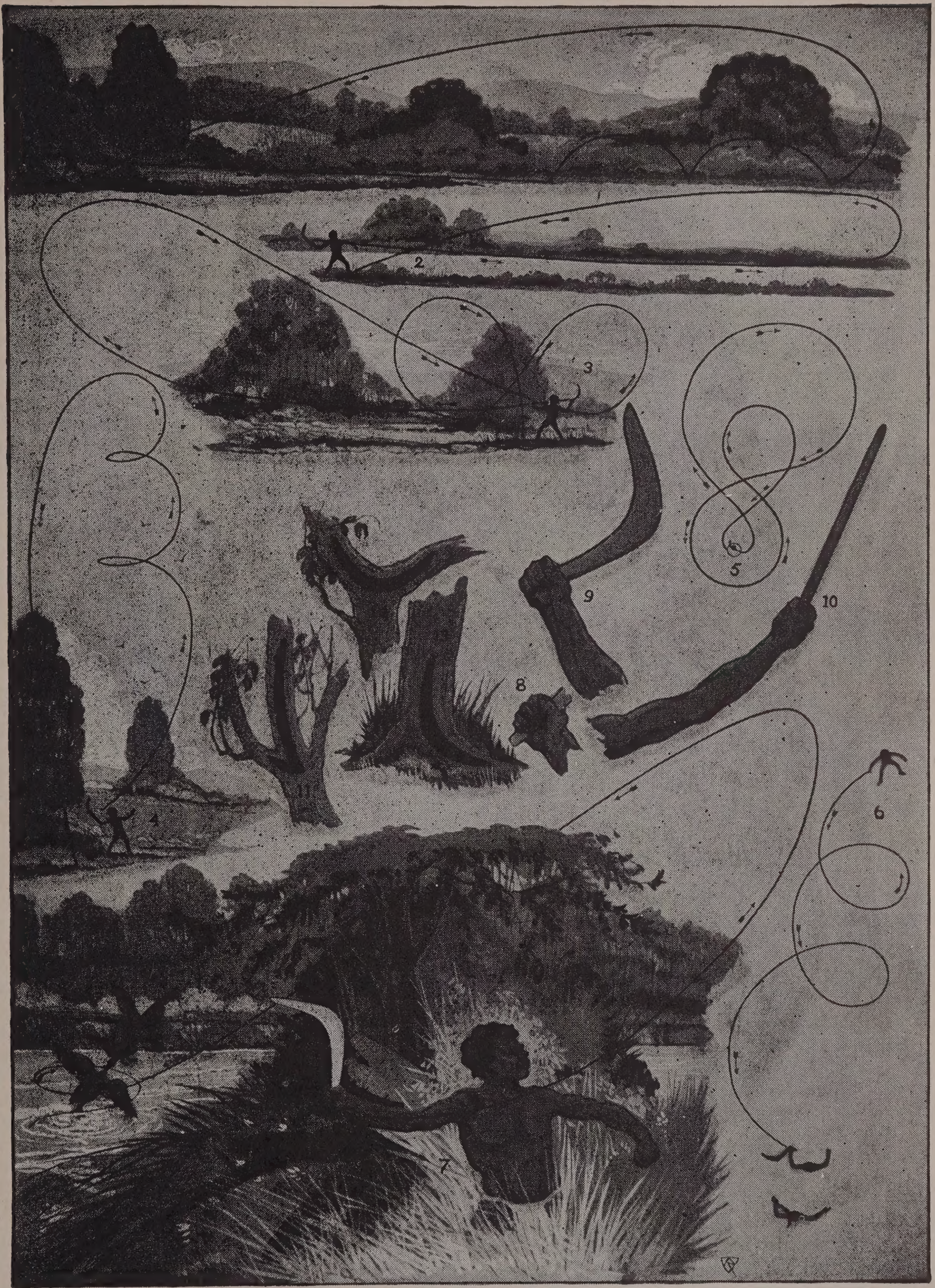
Book-Keeping, a method of recording the transactions of business houses by a system which shall show with ease and exactness on inspection, the extent and soundness of the business done by a merchant, trading firm or corporate company engaged in business operations, while setting forth the extent of the resources and liabilities, losses or gains, together with the capital and stock in trade, of such merchant, firm or company doing business. In the case of partnership firms—and indeed the case of all—the necessity of keeping books of account and of having recourse to a system of book-keeping, either by Single or by Double Entry, will be apparent and obvious; while it is vital to the exigencies of any merchant or firm doing a more or less large business and desiring to do with precision and exactness a financially correct and sound business. The two systems of bookkeeping are (1) that by Single Entry, the simpler of the two, and (2) that by Double Entry, both being in use as the volume of trade calls for. Under the former, the books in use are a Cash book, Day book and Ledger; under the latter, a Journal is called for in addition. By both systems the transactions recorded in either set of books should for accuracy be checked over at least monthly, and an abstract or resumé made, and more especially so if the business done is on a large scale. The Single Entry system is mainly used where transactions can be simplified, if on a small scale, as in the case of retail merchants where it is necessary to record only the purchases and sales for cash or credit. The more satisfactory, though more intricate, system of Double Entry is resorted to where business is done on an extensive scale, calling for the record of a transaction or sale first on the debtor or creditor side of an account, and again on the contrary side of some other account. By the latter system the merchant can more readily inform himself of the exact state of each account, and not alone of the goods sold, but of what he has on hand, without the necessity of first taking account of stock. Transactions in which cash plays a part are entered first in the Cash book, after the same manner as entries are made in the Day book, i.e., after setting forth the customer's name and date of the entry, with the term Dr. or Cr. annexed, according to the nature of the transaction—Dr. when goods are sold, and Cr. when goods are bought or received. Goods bought on credit are entered under "Cr." and the entry should be preceded by the word "By;" when they are sold on credit, add "Dr." to the purchaser's name and residence, and precede the entry with "To." The Ledger in both systems is the most important of the books, and under the Double Entry system into it are transferred the entries under their separate heads from the Journal—each item being entered twice, once on the Dr. side of an account and once on the Cr. side of another account. Many firms have subsidiary books, such as a Petty Cash book, which is usually balanced monthly or oftener and its total expenditures are transferred to the Cash Book proper, under the head of Petty Cash. The other books embrace a Sales book, an Invoice and an Inventory book, and a Bills Receivable and Bills Payable book and Bank book, besides the balance sheets statedly utilized. The Bank book should, of course, show on the debit side the sums periodically deposited, and on the credit side the sums withdrawn—the remaining amount, unless the account should happen to be overdrawn, being closed "By Balance," to be carried forward to the new month's business. In the Double Entry system, where there is but one owner (without partner), a stock account should be opened, in which the owner is credited with his investment or capital, together with the gains of the business, and debited with all sums withdrawn and liability assumed, as well as with the losses incurred, if there be any. Similarly, the Merchandise account should be debited with the original sum invested as the purchase money of the concern, and credited with the sales and the amount of stock on hand, when ascertained. When the stock has all been sold, or the amount on hand figured out, the account will, of course, show the resultant gain, or loss, whichever may happen to preponderate. In like manner, Bills Receivable are debited with the notes given or drafts accepted for purchases of stock, and credited when these mature and are paid. Bills Payable are similarly credited when the notes of the house, if any, are issued, and debited when they are redeemed and paid.

Boom'erang, an instrument used by the natives of Australia in hunting and war. It is about two feet long, flat on one side and rounded on the other, with a sharp edge. It is made of hard wood bent into a curve. The method of using this remarkable weapon is as follows: taking it by one end with the bulged side downward, the Australian throws it forward as if to hit an object some yards in front. Instead of going straight forward, it slowly rises in the air, whirling round and round in a curved line, until it reaches quite a height, when it begins to fly back again, and, sweeping over the head of the thrower, falls behind him. This surprising motion is produced by the action of the air on the bulging side of the boomerang. The Australians have a remarkable skill in the use of this weapon, and it is said that with it they can almost cut an animal in two.

Boone, a city and county-seat of Boone County, Iowa, 36 miles from Des Moines. In the vicinity are deposits of coal, also fire and pottery clay, and the city is engaged in the mining and shipping of coal and the manufacture of pottery, tiles, brick, flour, etc. Boone has a public library, a hospital and the service of three railroads. Population, 12,253.

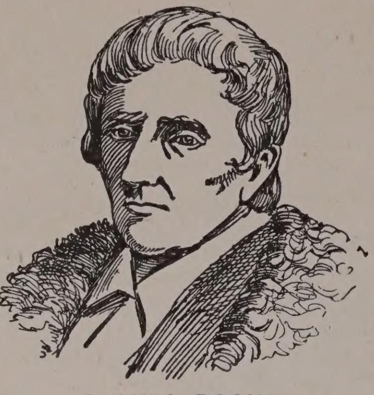
Boone, Daniel. For more than a century this famous hunter and Indian fighter and pioneer, has fired the imaginations of the American boy and inspired biographer, orator and poet. Of the hundreds of backwoodsmen who, in Revolutionary days, broke across the Alleghenies, his personality is the most picturesque,

GYMNASTICS OF THE BOOMERANG



The Australian bushman can make his boomerang do all these things. In No. 1, he shoots it ahead of him so that it strikes the ground, makes two loops and then one grand loop through the air back to his feet. In No. 2, it sails through the air and comes back again without touching the ground. In Nos. 3, 4, and 5, it is executing various other air maneuvers more complicated than those of the bird-man. No. 6 shows how a boomerang with a hook at the end can be made to catch on the shield of an opposing warrior and hop right over at him. In No. 7, the bushman concealed from view, is "shooting" a duck. Figures 11, 12, and 13 show how boomerangs of different shapes are cut out of trees.

his character the most admirable and his life the longest. Born on the frontier in Pennsylvania in 1735, he lived on the frontier in North Carolina, blazed a way through the Kentucky wilderness for settlers, and died at an outpost of civilization in Missouri in 1820. The spirit of the red man was no more alien to the settlement than was Daniel Boone's. In the eighty-five years of his life he never lacked 'elbow-room," free land, stirring adventure, game for his unerring rifle or courage and resource to meet danger.



DANIEL BOONE

The boy who fancies this the ideal career does not realize the rough schooling that was the necessary preparation for it. Except for the scattered clearings, the valley of the Schuylkill, where he was born, was wild pasture and untamed forests. His parents were Quakers, and they and their Quaker and Dutch neighbors were dependent for a living more upon hunting than upon crops. So the boy grew up in the wild, strong, brave, inured to hardship and as skilled in woodcraft as an Indian. Scarcity of game forced the family to emigrate to the high western valley of North Carolina. There, at the age of 21, Boone married. When he was 24, he joined a party under the guidance of John Finley, and by way of the old Indian trail across Cumberland Gap broke into the hunter's paradise of Kentucky. Contrary to popular belief, Boone was not the first white man in Kentucky, and, as a permanent settlement, Harrodsburg antedated Boonsboro by a year. His son Enoch was, however, the first white child born in the state (1777), and Boone, as justice of the peace, celebrated the first marriage ceremony (1776). The hero of border warfare, he is, as a military figure, insignificant beside George Rogers Clark. But in the mischances of frontier life, with daring men constantly making early and violent exits from the stage, Boone seemed to bear a charmed life. For half a century he slept with his food-pouch filled and his moccassins tied to his gun-stock. His adventures are more stirring than those of the most lurid dime novel.

Such was his fame that, when he emigrated to Missouri in 1792, the Spanish government gave him 8,000 acres of land and made him commandant of the Osage district. There he dwelt in patriarchal state, his sons and daughters around him, for nearly thirty years, hunters, explorers and emigrants taking counsel of his wisdom. For artists he seems to have had great fascination as a subject, and several went out to paint his portrait. One has described him in old age as of medium height but erect and athletic. His head was of noble shape, with a high, bold forehead, his mouth wide and thin-lipped, his eye a clear blue and of direct gaze. Courage and honesty were his patent traits; his expression was mild, his manner amiable. He was unspoiled by his great reputation, and remained the simple, unlettered child of nature to the last. At eighty-two years of age he looked ten years younger, and went off on a long hunting trip to the Kansas River. He died suddenly in his 86th year, and his bones were removed to Frankfort, Kentucky. His adventures, as told by himself, are edited by John Filson. The latest and best biography is by Reuben Gold Thwaites.

Booth, Edwin Thomas, one of the greatest of actors, a son of Junius Brutus Booth, was born at Belair, Maryland, in November, 1833. He was educated for the stage, and early appeared in several minor parts with his father; and on one occasion filled successfully his father's place as Richard III. He made a trip to California, then to Australia, and on his return to New York appeared as Richard III, and soon gained a high reputation for his playing of Shakespeare's leading characters, especially Iago and Hamlet. In 1861 he went to Europe, playing in England and studying his art on the continent. Returning to New York, he produced the play of *Hamlet* at the Winter Garden for 100 nights. In 1869 he opened a splendid theater in New York, devoted to the classic drama, at a cost of over $1,000,000. In 1880 and 1882 he visited England again and also Germany, and was received everywhere with enthusiasm. His career was one of the most brilliant in the annals of the drama. Besides the characters of Shakespeare he represented, his rendering of Richelieu, in Bulwer's drama of that name, won him fame. He died at New York, June 7, 1893

Booth, John Wilkes, an American actor, notorious as the assassinator of Abraham Lincoln, was born in Maryland in 1838, and was shot on April 26, 1865, near Bowling Green, Va., while resisting arrest, by Sergeant Boston Corbett. His father was Junius Brutus Booth, from whom he inherited a touch of insanity. On April 14, 1865, while President Lincoln was attending a play in Ford's theater, in Washington, he was fatally shot by Booth, who exclaimed, as he did the foul deed, *Sic semper tyrannis* (ever thus to tyrants) The motive for the infamous act was Booth's sympathy with the south in the Civil War.

Booth, Junius Brutus, a noted tragedian, was born at London in 1796. After essaying different professions, he made his first appearance on the stage in 1813. He was engaged for some time at Covent Garden theater and at Drury Lane theater, where he played with Edmund Kean, each taking alternately the characters of Othello and Iago. After traveling on the continent, he emigrated to America in 1821, and for thirty years played in nearly every theater in the country. His favorite characters were Richard III, Iago and Sir Giles Overreach; but he also excelled in Othello, Lear, Shylock and Hamlet. He stands in the first rank of tragedians. He died on board a Mississippi steamer in 1852.

Booth, Rev. William, the founder and "general of the Salvation Army," was born at Nottingham, England, in 1829. The work which led to the creation of the Salvation Army was begun in 1865, in the east end of London, and has been known by that name since 1878. The general was ever the mainspring and controlling power of the movement, directing its operations both at home and abroad from his headquarters at London. In 1890 he wrote a book called *In Darkest England,* in which he showed the wretched condition of the poor of London, and described the work the Salvation Army was doing for them, and the plans for future work. Many of these plans have been put in operation since the publication of the book. He died in London, Aug. 20, 1912. See SALVATION ARMY.

Boothby, Guy Newell, the novelist, was born at Adelaide, South Australia, Oct 13, 1807. He crossed Australia from north to south in 1891, and has traveled extensively in the Orient. His works of fiction, which number more than a score, have attracted readers throughout the English-speaking world, being published simultaneously in England, Australia and the United States.

Boots and Shoes. In the United States the manufacture of boots and shoes in almost all their detailed processes and operations has set aside the former slow method of entire hand-work, and for many years has been extensively performed by machinery. If there is a hand process still clinging to their manufacture, it is that of cutting and shaping the leather for the uppers. With perhaps only that exception, the varied processes gone through, including skiving, welting, lasting, sewing and tacking, heeling, rounding, insoling, coloring and finishing are those of elaborately and ingeniously applied machinery. In the Old World machinery is not by any means so largely used, even in the case of military and hunting boots, those of grooms and jockeys and the elaborate Hessian Wellington and other styles of jack-boots; nor is machinery used to any great extent, even in the turning out of ankle-boots and women's low shoes. Extensive also in this country is the manufacture of cloth and rubber boots and shoes, the trade in the latter being now an enormous industry in the New World, while the extent to which they are now exported is increasing.

Borax, a compound of boracic acid and soda, found as a saline incrustation in certain lagoons and lake shores chiefly in Persia, Tibet, Chile and Peru. It is also extensively procured in its crude forms in the dry lakes or in their muddy bottoms of California and Nevada, the production from the Pacific coast being valued annually at about $750,000. It is soluble in boiling water and has a slight alkaline taste. It is put to a variety of uses, but chiefly in a flux state in aiding the fusion of metallic mixtures, and in producing silicates in welding iron, in soldering metals and other brazing operations, as well as in making enamels and in fixing the colors on porcelain. It is, moreover, used as a food preservative and as a detergent in the laundry. In combination with glycerine it is also used as a disinfectant and antiseptic for sore throats and in the treatment of thrush in children's mouths. The crude native borax imported from Tibet, and once the chief source of boracic compounds, is known as tincal.

Bordeaux (*bôr'dō'*), the third seaport of France, lies in the department of the Gironde, on the left bank of the Garonne, about sixty miles from its mouth in the Atlantic, but easily accessible to ships. Trade by railroad and by the Garonne is very large. The principal industries are the making of sugar, cigars, calicos, woolen goods, paper, etc. In 1898, the volume of trade passing in and out of Bordeaux was in value 676 millions of francs. The wines of Bordeaux are noted, both the red wines, which are often called claret, and the white wines The river is crossed by a noble bridge of seventeen arches, with a length of 532 yards. The city can boast of some of the finest examples of architecture in Europe, among them a large number of cathedrals and churches, and the Grand theater Here also are schools of theology, medicine, art and science, an imperial college, a gallery of paintings, a museum and an observatory Bordeaux is a very old city and has some Roman remains. When under English occupation it was for awhile the seat of the splendid court of the Black Prince. Population 260,000.

Bordeaux Mixture, the most generally used remedy for blights and other fungous diseases of plants. It is applied as a dry powder by dusting or in liquid form by spraying (q. v.). Its advantage over other fungicides is its cheapness and its safety, as respects both operator and plant. Formula of the liquid form: water 50 gallons, quicklime three to six pounds, copper sulphate three to six pounds, depending on the plant treated. The dry mixture is made so that the copper sulphate will be the same chemical state as in the liquid; it is somewhat harder to prepare, but is lighter and often more convenient to apply. The chemical condition and therefore the efficiency of either depend on proper preparation.

Borden, Sir Robert Laird, became premier of Canada after the defeat of the Laurier ministry on the reciprocity issue in 1911. He was born in Grand Pre, Nova Scotia, June 26, 1854, and educated at Acadia Villa Academy, Horton. He was called to the bar in 1878, and from 1896 until his retirement served in the Dominion House of Commons. From 1901 to 1911 he led the Conservative opposition, and from 1911 to 1920 he was premier. Of all the premiers of the Allies, Borden was the only one who conducted his country's affairs from the beginning to the end of the war. He was Canada's chief representative at the peace conference.

Bore, also called **Eagre,** a peculiar tidal effect at the mouth of certain rivers. When a river's mouth widens rapidly, and it is subject to high tides, the spring flood-tide drives an immense volume of water from the sea into the river. The water collects in the mouth faster than it can flow up into the river, and so there is gradually formed a kind of watery ridge stretching across and rushing up the opening with great violence and noise. It sometimes rises many feet The most notable Old World bores are those of the Ganges, Brahmaputra and Indus. In one branch of the Ganges the bore travels seventy miles in four hours, and often it appears suddenly as a wall seven feet high.

Boreas, the north wind, was one of the nature gods in the Greek myths. He was depicted as an old man, with hair and beard flaked with snow and having wings. The Athenians built him a temple for assisting to wreck the fleet of the Persian monarch Xerxes.

Borgia (*bôr'jȧ*), **Cæsar,** whose father afterwards became Pope Alexander VI, was born in Italy in 1475, and at an early age entered upon a career of crime and ambition. A cardinal at 17 (A. D. 1492) and soon after captain-general of the church, he sought to push his way to power by the destruction of all who stood in his path. He planned a new kingdom of central Italy, and it required a league of all Italy and of the most powerful sovereigns of Europe to thwart his energy and ambition. The death of his father, who was his ally, and his own capture by his enemies put an end to his plans. He escaped and fled to the court of Navarre, but was soon after killed (1507), at the age of thirty-two.

Borgia, Lucretia, sister of Cæsar Borgia, a beautiful and accomplished woman was born at Rome in 1480. During the lives of her father and brother, she was several times married to further their plans, but in later life, as the duchess of Ferrara, she was celebrated for her piety and love of art and learning. She died in 1519.

Bor'neo one of the islands of the Malay Archipelago, and the largest island in the world, lies in the Indian Archipelago, south of the China Sea. Its length is about 800 miles, its breadth 700, and its area, British and Dutch, 244,000, nearly as large as Texas. The population is about 2,000,000.

Surface and Rivers. The island is mountainous, reaching its greatest height in Kini-Balu, which is about 9,500 feet above the level of the sea. Unlike the other islands of the Indian Archipelago, Borneo has no active volcanoes. It has an extensive river system and many lakes, swarming with crocodiles, and many of the rivers are navigable far inland for boats of considerable size. The climate of the lowlands is unhealthy for Europeans, but the highlands have a more moderate temperature.

Natural Resources. The forests produce many valuable woods, oils and gums; the mohor tree, used for making boats, reaching a height of eighty feet, and the kaladang, suited for large masts, growing 200 feet high. The forests abound in wild animals; among them are the orang-outang, rhinoceros and elephant; and various birds, as the swift, which constructs the edible nests prized by the Chinese for soup. Among the abundant mineral resources of Borneo are valuable diamond mines.

People and Products. The inhabitants are Malays, Dyaks, Negritos and Chinese. The chief Dutch settlements are Sambas, Pontiana, Banjarmassin and Koti. Vegetation is luxuriant. Spices, rice, millet, sweet potatoes, cotton, indigo, tobacco, etc., are among the island products.

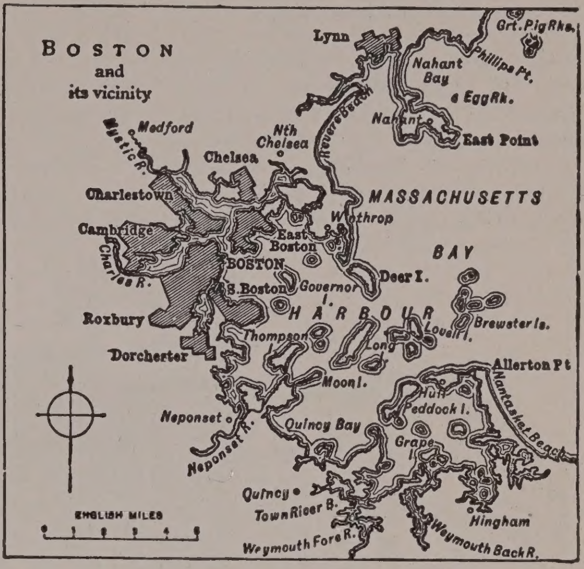
Political Divisions. The country is divided into districts, ruled by sultans; but foreign powers have obtained control of large portions. The largest portion of the island belongs to the Netherlands. British North Borneo, including Brunei, Sarawak and Labuan—all under British influence—has an area of nearly 42,000 square miles, with a coast-line of over 900 miles.

The Dutch have the control, directly or indirectly, of by far the larger part of the island, and have divided the southern part into the residency of the western division, with the capital at Kuching (population, 18,000), and that of the southern and eastern, with its capital at Banjermassin (population, 50,000). Borneo was discovered by the Portuguese in 1518, and the Dutch visited the island in 1598, and in the 17th century made a settlement there. Population estimated at 2,000,000.

Bos'nia, and Herzegovina provinces in northwest of Balkan Peninsula, formerly under Turkish rule, annexed by Austria in 1908 in violation of the Treaty of Berlin, but were made a part of the new southern Slav state of Jugo-Slavia (*q. v.*), following the World War (*q. v.*). The joint area of the two is 19,768 square miles, and the population is over a million and a half. Bosnia is mountainous, covered with forests, and interspersed with beautiful valleys. Numerous rivers flow northward and join the Save, which forms the northern boundary. The people are mainly Slavs, divided by religion into Mohammedans and Christians; a condition which was the source of constant disorder and bloodshed before Austrian rule under which the adherents of both faiths were protected.

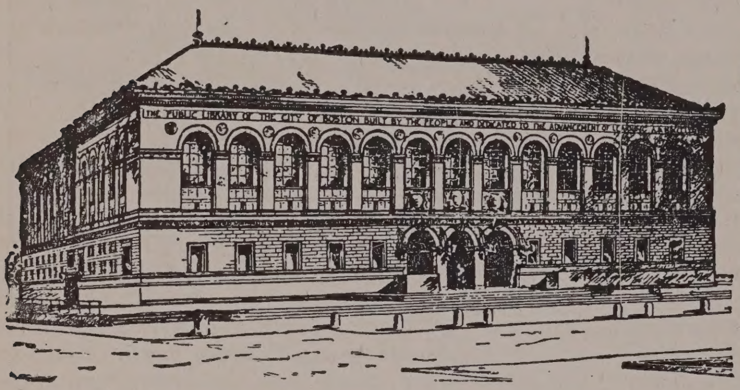
Bosporus or **Bosphorus** meaning ox-ford, from the legend that Io swam across it in the form of a cow, is the channel that separates Europe from Asia and connects the Black Sea and the Sea of Marmora. It was more particularly called the Thracian Bosporus to distinguish it from other straits to which the same name had been given. Throughout its length the strait has on either side seven bays or gulfs, with corresponding promontories on the other side. One of these gulfs, often called the Golden Horn, forms the harbor of Constantinople. The Bosporus is about seventeen miles long and from a third of a mile to two miles broad, with an average depth of about 180 feet. The banks are richly dotted with cypress, laurels and ancient plane trees, and covered with palaces, villages, villas and gardens. It was at the middle of this strait that Darius made his bridge of boats when he marched against the Scythians. The Bosporus has long been under the control of Turkey, and by common consent of the European powers, is closed to all but her own war vessels, though the sultan may open them to his allies in time of war.

Boston, the capital of Massachusetts, the chief city of New England and the fifth largest city of the United States, stands at the western end of Massachusetts Bay, at the mouths of the Charles and Mystic Rivers. Founded in 1630, it was first called Trimountain from the three hills which then formed a marked feature of the landscape. Since that time it has taken a prominent part in the history of America. Here was published the first regular newspaper (1704), and the same Puritan spirit which led to the punishment here of heretics, Quakers and witches, contributed largely to the determined opposition to the oppressive measures of England which resulted in the Revolution. The Boston Massacre and the destruction of the British taxed tea in the harbor are famous. Otis, Hancock, Samuel Adams and Warren were all Boston men. Boston has also done much for the literature and culture of America. Longfellow and Lowell, Whittier and Emerson, Hawthorne and Holmes, Thoreau and Parkman, Motley and Prescott dwelt in or near the Puritan City.



Boston has a fine system of parks, Franklin park (the largest) has an area of 527 acres. These parks are connected by miles of wide and handsome boulevards. Boston Common (48 acres) and the public gardens are greatly enjoyed by the people, because situated in the center of the business section of the city. The metropolitan park commission has secured and opened to the public a system of parks around Boston, including the Blue Hills Reservation, Middlesex Fells, Revere and Nantasket Beaches, tracts along several rivers, ponds and brooks, to the extent of over 12,000 acres and costing over five million dollars. The estimated area of the city is 42 square miles. In 1872 the city was visited by a destructive fire, which destroyed over 75 million dollars worth of property in the business section; but the evidences of this destruction have long since disappeared, and a new face was soon put upon the city's aspect. Among the historic buildings of the city are the State House, Christ Church, the old South Church, Faneuil Hall, called the Cradle of Liberty, and King's Chapel. The later noted buildings include Trinity Church, the Custom House Tower the Museum of Fine Arts, the Museum of

Natural History, the Chamber of Commerce, the new Symphony Hall, Opera House, the Massachusetts General Hospital, the Christian Science and the Spiritualist Church and the fine home of the Massachusetts Historical Society, the government postoffice, building built of granite, and various asylums, handsome club houses, beautiful homes in the residence district, etc. The city is adorned with statues and monuments: the great Bunker Hill monument and statues of Washington, Hamilton, Winthrop, Webster, Edward Everett, Charles Sumner, Josiah Quincy, Benjamin Franklin, Horace Mann and a score of other noted Americans. Boston University, the Massachusetts Institute of Technology and Boston College are excellent institutions of learning. Educationally, Boston is noted for its great free library with numerous branches (containing over 1,000,000 volumes), its Boston Athenaeum, with a library of over 200,000 volumes, its fine school-houses, many special and suburban high schools, the large per cent. of pupils in the latter and its remarkable school attendance. Very few children of school age are on the street. Several of the great publishing firms are located in this city. Boston has large manufacturing interests, and is the principal mart for the sale of wool, shoes and leather. The surface and elevated electric cars pass under the Common and Tremont and Winter Streets, through magnificent subways built by the city.


THE PUBLIC LIBRARY OF THE CITY OF BOSTON BUILT BY THE PEOPLE AND DEDICATED TO THE ADVANCEMENT OF

BOSTON PUBLIC LIBRARY

In foreign trade the city holds the third place with New York first (the extent of its foreign commerce, exports and imports, reaching two hundred and sixty million dollars in amount), and 20 lines of ocean steamers ply regularly between this city and foreign ports. The railroad system of New England centers chiefly in Boston. There are two great union stations, the North Union and the South Terminal; the latter handles the world's largest number of passengers. The chief railways entering the city are the Boston & Albany, Boston & Maine, New York, New Haven & Hartford. The population of the city proper is 800,000 while the Metropolitan district—that is to say, taking in the city and its suburbs, has 1,600,000 inhabitants.

Boston University, located in the city of Boston, Mass., was chartered by the state in 1869. It has 150 instructors and over 1,400 students. It is a thoroughly equipped institution, and is noted for the facilities which it affords for advanced work in its graduate and professional schools. Massachusetts Agricultural College at Amherst is a branch of the university.

Boswell. See Johnson, Samuel.

Bos'worth, a market town of England, twelve miles from Leicester, near which was fought the famous battle of Bosworth, August, 1485. In this battle, the death of Richard III, who, deserted by his forces, had rushed into the thick of the enemy, crying "Treason, treason," ended the long civil wars of the Roses. At the close of the fight, the crown was found near a hawthorn bush, and was placed by Lord Stanley on the head of the new king, Henry VII, on an eminence which is still called Crown Hill.

Bot'any. The science which deals with plants. It should be understood in the outset that botany is one division of biology, and that it simply means a study of biology with plants as illustrative material. The history of botany is a very long one, but the real development of the science has taken place during the last century. Naturally, the first attention given to plants was to discover those which are useful to man for food, in the arts or in medicine. In fact, the medicinal use of plants was for centuries the only representative of a botanical science. A true science of botany, however, began with attempts to classify plants. Aristotle and Theophrastus had classified all plants as trees, shrubs and herbs, and there was no further attempt to develop a scientific knowledge of plants until the 16th century. It was then that students again began to arrange plants into groups, but these groups were very artificial. These attempts finally culminated in the famous artificial system of Linnæus, which was published in the middle of the 18th century and was in use to the middle of the 19th century. Since that time a great advance has been made in constructing what are known as natural systems of classification, which attempt to put those plants together which are really related. As a consequence, the subject of classification or taxonomy, as it is called, is upon a very substantial basis. Taxonomy is the oldest phase of botany, but it continues to represent to many the whole subject. It is not unusual to meet people who think of botany as the analysis of flowers. Of course, taxonomy includes the classification of flowering plants, but it includes a classification of all other plants as well.

During the last part of the 18th century a new phase of botany began to be developed, which deals with the structure and development of plants and their organs. This became possible through the invention and gradual improvement of the microscope, so that the minute structures of plants could be investigated. At first botanists interested themselves merely in the structure of mature plant bodies, and as the knowledge of the cell gradually developed the field of anatomy came into view, which has to do with the various cell aggregates known as tissues which enter into the plant body. Later, however, botanists began to be more interested in the way in which the tissues are related to one another to form the plant body and its organs, and the science of morphology began to exist. This last subject for a time contented itself with the study of the forms of plants and their organs, but presently passed into the more important phase of studying the gradual development of plants and of their organs, subjects which are often called embryology and organography. Morphology not merely studies the development of structures, but it studies the relationships of plants which are thus revealed, and hence is interested in what is known as phylogeny, that is, the ancestral history of plant groups.

During the time morphology was growing another view of plants was being developed, namely, that which deals with their life processes, or the plants at work. A good many botanists cared not so much for the structures of plants as for the activities of plants, and plant physiology began to assume importance. This subject developed with exceeding rapidity during the 19th century, and is certainly one of the most important views which can be taken of plants.

During recent years still another field of botany has come prominently forward, which deals with plants in relation to their environment, and is known as ecology. Under this phase the necessary relations of plants and their organs to light, heat, soil, temperature, etc. are studied, and also those exceedingly interesting communities which are known as plant-societies.

These may be taken to represent the principal fields of botanical activity today, but there are other botanical subjects which are of more special development. For example, pathology deals with the diseases of plants, paleobotany with fossil plants, economic botany with plants in relation to the interests of man, forestry with the problems of the proper cultivation and use of forests. Still further subdivisions of the general subject are common. For example, a bacteriologist is one whose attention is devoted to the bacteria; the phycologist studies the algæ; the mycologist studies the fungi; the bryologist is a student of mosses, etc.

Any elementary knowledge of botany should include something from all the principal divisions of the subject. For example, a beginning student should know how plants must relate themselves to their surroundings in order to live (ecology). He should know how plants make food and use it, how they are irritable and respond to stimuli, and how they reproduce (physiology). He should also learn something of the essential structures of the great groups, so that he may know the make-up of a toadstool, moss, fern, flowering plant, etc. (morphology). He should also have some general knowledge as to how plants are put into great natural groups or families, and he should be able to discover the names of the important plants of his vicinity (taxonomy).

John M. Coulter.

Bot′any Bay, a harbor in New South Wales, on the east coast of Australia, five miles south of Sydney. It was discovered by Captain Cook in 1770, and named from the large number of beautiful flowers and shrubs in its vicinity, though in other respects it is rather barren. In 1787 it received England's first penal colony in the east, and although the colony was removed the next year to Port Jackson, yet Botany Bay long continued to be the popular name, not only for this colony, but for all convict settlements. The spot where Captain Cook first landed is now marked by a monument.

Botha, Louis, Dutch burgher general in the Boer War with England (1899–1902), was a native of Natal, where he was born about the year 1861. In the war he defended the line of the Tugela River against Sir Redvers Buller, recaptured Spion Kop, and on the death of Joubert succeeded him as commandant-general of the Boer army. He had the reputation of being an able and attractive man, instinctively humane and even peace-loving and an ideal soldier. He died in 1919.

Both′nia, Gulf of, the northern part of the Baltic Sea, between Finland on the east and Sweden and Lapland on the north and west. Its greatest length is about 450 miles, its average width 100 miles, and its depth from 120 to 300 feet. Along its shores as well as out in the gulf are numerous small islands, sand banks, rocks and cliffs called *skoers*, which make navigation difficult. It has, however, many good harbors, and timber is exported from several ports. A large number of rivers pour their waters into the gulf, and the alluvial deposit from these is causing the land in the upper part to extend, while that in the lower part is slowly sinking. The dwellers along the shore are engaged in the herring trade. In winter the gulf is usually frozen so hard that it can be crossed by sledges. The water is but slightly salt.

Bothwell. See Mary, Queen of Scots, and Stuart.

Botticelli, (*bŏt′tê-chĕl′lê*) **Alessandro Filipepi,** known as Sandro Botticelli, the latter name being added by his companions after his oldest brother, was born at Florence, 1447, the youngest of five sons of Mariano Filipepi, a tanner. He loathed the drudgery of schools and gave little attention to his studies except those in which he was heartily interested. Learning this, his father apprenticed him to a goldsmith. In that day the goldsmiths were artists and closely associated with the painters. Young Sandro longed to paint and soon abandoned his trade, after the usual struggle with his parents, who desired a trade in preference to an art, and entered the atelier or studio of Fra Filippo Lippi.

Botticelli being a very sensitive youth was easily influenced and in his early work we find the influence of his first master. Being of a serious nature, he soon lost sympathy with Lippi's way of working and his painting shows the bolder style of Verrochio. When he was called upon to make one of a set of six panels whose subject was the virtues, for the Mercanzia in Florence, he easily adapted himself to the style of the brothers Pollaiuolo, who painted the other five. This was his famous *Fortitude*, his first important work. But Botticelli soon developed an individual style which is most evident in his Madonnas. In these he asserts his greater self, and we have all the charm and sympathetic feeling of the real Botticelli. He painted the spirit and not the material; his work was never personal but general; never the individual but the type and the type always the ideal.

In 1481 he was commissioned by Sixtus IV to assist in the decoration of the Sistine Chapel at Rome. Here he painted three magnificent frescoes of glorious conception. He rarely signed his paintings, which makes it difficult to place them in chronological order, but his style makes it easy to distinguish his work, though some of his students in copying it did it so well that their paintings have passed for his.

Lorenzo dei Medici, the great patron of art, invited Botticelli to join the circle of artists that formed his court, a great honor to be bestowed upon a painter, for Lorenzo was a competent judge. It was under his patronage that Botticelli painted most of his great canvases of mythological and historical subjects. Among them are *Pallas Subduing a Centaur, Venus among the Graces* and *the Birth of Venus. The Coronation of the Virgin* at the Florentine Academy and the *Adoration of the Magi* are two of his largest and best works, in which appear the portraits of the Medici princes and their retinues. But Savonarola and his wave of religious reform swept the country, and Sandro fell under his influence, after which he painted little, but these paintings were masterpieces with a deeper religious significance. He illustrated Boccaccio and made eighty-eight drawings for Dante's *Divine Comedy* and eight for the *Inferno*. The latter were engraved by Baccio Baldini and printed in Florence in 1481. Botticelli died in May 1510, alone and in poverty. His great influence on modern painting is shown in the work of the Pre-Raphaelites. See Jameson: *Italian Painters*.

Boucicault (*boo′ sê-kō′*), **Dion,** British actor and playwright, was born at Dublin, Dec. 26, 1822, and died at New York, Sept. 18, 1890. He was educated at London University, and in 1841 he brought out, with the assistance of an actor, John Brougham, the play entitled *London Assurance*. In 1853 he came to the United States, and for the next seven years followed the stage as a profession, making a hit especially by his Irish play, *Colleen Bawn*, which had great success on the English as well as on the Irish stage. His other favorite productions include *The Corsican Brothers, The Shaughraun, The Octoroon, Arrah-na-Pogue* and a dramatic version of Charles Reade's story *Foul Play*. As an actor he excelled in the delineation of Irish character.

Boudinot (*bōō′dê-nŏt*), **Elias,** American statesman and philanthropist, and a patriot of the War of the Revolution, was born at Philadelphia, May 2, 1740, and died at Burlington, N. J., Oct. 24, 1821. In 1777 he became a member of the continental Congress, and in 1782 was its president, in which capacity, in the following year, he signed the treaty of peace with Britain. From 1795 to 1805 he was director of the United States mint at Philadelphia. In 1813 he was one of the founders of the American Bible Society, and from 1816 to 1821 was its president. He gave much of his means to charity, and wrote a reply to Thomas Paine's *Age of Reason*, entitled *The Age of Revelation*.

Bouguereau (*bȯōōg′rō′*), **Adolphe Wm.,** a distinguished French painter and member of the French Institute, was born at La

Rochelle, Nov. 30, 1815. A student at the École des Beaux Arts, he won the grand *prix de Rome*, in 1850, with his picture of *Zenobia on the Banks of the Araxes.* His other canvases include *Philomela and Procne; The Bather; Harvest Time; The Scourging of Our Lord; The Virgin with the Angels; The Youth of Bacchus; Psyche and Love,* etc., together with many fine frescoes, mural paintings and decorative work executed for the interiors of public buildings in France. Bouguereau died in 1905.

Boulanger (*bōō′län′zhä′*), **George Ernest Jean Marie.** Born in 1837 and died in 1891. He was a French general who rose to the position of Minister of War (1886–1887). He became very popular in France, and his popularity turned his head. He disobeyed the commands of his superior officers, and became involved in royalist plots to overturn the republican form of government. He was removed from his command, and thereupon he withdrew from France and finally committed suicide. He was one of the officers who represented the French government at the centennial celebration of the battle of Yorktown in 1881.

Boulogne (*bōō-lōn′*), a town of France, in the department of the Seine, on the right bank of the river of that name; population, 57,027. It has numerous villas and over 400 wash-houses on the river, which is here crossed by a fine stone bridge of twelve arches. Paris is five miles southwest of the town, and separated from it by the famous Bois-de-Boulogne, a fine park crossed by many drives and paths. Here the fashionable world of Paris may be seen in the afternoons, and on the broadest of the walks in Easter week they travel to the Abbey of Longchamp. At the entrance of the park or wood lies Auteuil, famous as the residence of many literary men. Many of the trees were cut down during the Revolution, and some injuries were done during the siege of 1870–71; but all traces of these have since disappeared.

Bour′bon (*bōōr′bŭn*), a French family which for several generations occupied the thrones of France and Naples, and which still rules in Spain. It derived its name from the castle and state of Bourbon in the center of France. It dates back to the 10th century. The first French king among the members of this family was the famous Henry of Navarre, who became Henry IV in 1589, and whose descendants reigned until 1792 and again, after the downfall of Napoleon, from 1815 to 1848. The house of Orleans is a branch of this family, through Philip of Orleans, brother of Louis XIV. The present Louis Philippe, Duc d' Orleans, 1869, son of the late Count of Paris, an Orleanist, is the acknowledged head of the French house of Bourbon. The Spanish branch of the house of Bourbon was founded by Philip, Duke of Anjou, who was placed on the throne of Spain in 1700. This dynasty reigned until Queen Isabella was dethroned in 1868, but it regained the crown in 1875. Through the same Duke of Anjou was founded the Neapolitan branch, which ruled in Naples until it became a part of the kingdom of Italy in 1860. Another branch ruled in Parma and Piacenza most of the time from 1748, until they also became part of the Italian kingdom. (The important members of this family will be found mentioned in separate articles. See also FRANCE, SPAIN, NAPLES and PARMA.)

Bour′bon, Charles, duke of Bourbonnais, called Constable de Bourbon, was born in 1490, and died at Rome in 1527. His great ability, bravery and large possessions soon made him the first subject in France. For his exploits at the famous battle of Marignano in 1515, called the battle of the giants, he was made constable of France and governor of Milan. But at the French court he had many enemies, who undermined him in the favor of the king, Francis I. He made an alliance with Charles V of Spain and Henry VIII of England, and fled in disguise from France. He gathered round him a body of German soldiers, who became devoted to him. Fighting against his own country, he took part in the great battle of Pavia, in which Francis I was prisoner by the Spaniards. Bourbon was made Duke of Milan and commander of the Spanish army in northern Italy, and was one of the army that plundered Rome in 1527, where he was killed. Seizing a scaling ladder, in order to make his way over a weak place in the walls, he was rushing on at the head of his troops, when he was mortally wounded by a bullet, probably shot, it is said, by the great Italian artist, Benvenuto Cellini. His soldiers carried his corpse to Gaeta, and buried it under a magnificent monument, which has since been destroyed.

Bourget (*bōōr′zhä′*), **Paul,** French poet and novelist of the psychological school and member of the French Academy, was born at Amiens, Sept. 2, 1852. In 1873, when he had finished his education, he first showed his gifts as a critic, in an article contributed to the *Revue des Deux Mondes,* followed by a collection of poems. In this volume and in the later effusion of his verse as well as in his prose *Studies,* he showed the characteristics of his style and thought. His works are eminently realistic and analytical, and chiefly consist of studies of the scientific and pessimistic tendencies of the age. The following works from Bourget's pen have been translated: *Cosmopolis; Pastels of Men; Antigone and Other Portraits of Women; Domestic Dramas; Outer-Mer;* and *Impressions of America.*

Bourinot (*bōō′rĭ-nō′*), **John George.** He held honorary degrees from several universities, was president of the Royal Society of Canada in 1892, and member of Council of American Historical Association and of the American Academy of Political Science. He is favorably known as the author of *Parliamentary Procedure*, of a *Manual of the Constitutional History of Canada;* of *How Canada is Governed; History of Canada* (in the Story of the Nations series); and *Canada under British Rule*, 1760–1900 (with maps). He was a contributor to leading reviews and journals such as *The Quarterly Review*, *Johns Hopkins University Political Studies*, *Blackwood* and the *Magazine of American History*. Born in 1837, his death occurred in 1902.

Bout′well, George Sewall, American financier and statesman, was born at Brookline, Mass., Jan. 28, 1818. After studying law he was for a number of years member of the Massachusetts state legislature, and in 1852–53 was governor of the state. He took part, later on, in the organization of the Republican party, and was a delegate to the Chicago convention that nominated Lincoln for the presidency. In 1862 he organized the internal revenue department of the United States, and was its first commissioner. During the years 1863-69 he represented his state in congress and was secretary of the treasury in Grant's cabinet. From 1873 to 1877 he was a member of the United States senate. He is the author of a number of works on educational topics and of a volume of speeches and papers, political and economical. He died Feb. 27, 1905.

Bowdoin (*bō′d’n*) **College,** an institution of learning, situated at Brunswick, Maine, of which Longfellow, Hawthorne, Chief-Justice Fuller and Speaker T. B. Reed were graduates. It received its charter in 1794, and was opened in 1802. Besides its art department, it has a medical school in affiliation with it, and is well equipped with library, gallery of paintings and chemical and philosophical apparatus. The institution is undenominational.

Bowdoin, James (1727–1790), one of the early governors of Massachusetts, noted for his suppression of Shay's rebellion, and with his son as a benefactor of Bowdoin College, to which they gave land, money, apparatus and works of art.

Bowell, Hon. Sir MacKenzie, premier of Canada from Dec. 1894 to April, 1896, when he was succeeded by Sir Chas. Tupper. Born in England in 1823, he came to Canada when 9 years old, and became a printer's apprentice in 1834. Connected with the press for half a century, he was elected to the House of Commons in 1867 and remained a member continuously until 1892, when he was appointed to the Senate He became a member of the Abbott administration in 1892 and of the Thompson administration in 1893. As minister of trade and commerce he visited Australia in 1893 with the object of creating trade between Canada and Australia. He was chairman of the colonial conference in 1894.

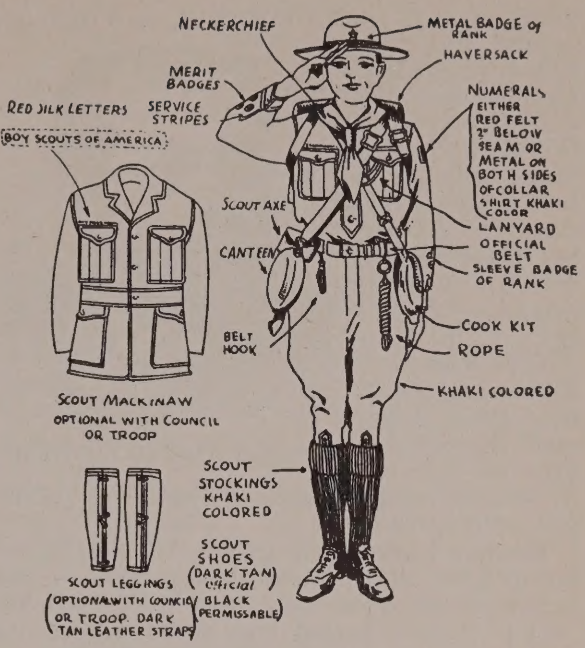
Bowen (*bō′ĕn*), **Francis,** an eminent American writer on political economy and moral philosophy, was born at Charlestown, Mass., Sept. 8, 1811, and died at Cambridge, Mass., Jan. 21, 1900. After graduating at Harvard in 1833, he subsequently held there the chair of political economy. From 1843 to 1854 he owned and edited the *North American Review*, and was one of its chief contributors. In 1853 he became Alford professor of natural religion, moral philosophy and civil polity in Harvard University, His writings embrace *Critical Essays on Speculative Philosophy; Moral Philosophy; Political Economy;* Lives of *James Otis* and *Baron Steuben*, contributed to Sparks's *American Biography;* together with *Gleanings from a Literary Life*.

Bowls and Bowling. Bowls is an outdoor game, largely played from an early period in Scotland, as well as in this country from colonial times on a flat and smooth piece of turf. Bowling is a kindred game, sometimes called skittles or ten-pins, played on a boarded alleyway (generally about 42 by 72 feet in extent). Lawn bowls is played on a piece of level turf, about 40 yards square, divided into numbered rinks, the players (2, 3 or 4 on either side) playing off a mat at the starting point, each with two lignum vitae bowls. The object played at is a distant smaller white porcelain ball —the game being to place the bowls as close to it as possible. The bowls (commonly 3½ lbs. each in weight) are made weighted slightly on one side, so that the player may reach the jack with his bowl by a curved rather than by a straight course roll. Alley-way bowling is played with balls not over 27 inches in circumference, each weighing about 15 lbs. These are played from one end of the court, with a preliminary run of 12 or 15 feet by the player, against a series of upright pins, ten in number and 15 inches in height, placed at the far end of the alley-way or court. The pins are set up in pyramidal form, 12 inches apart, the head pin being in the forefront of the series, so that when hit by a bowl the player has a chance of knocking down some and, if lucky, all of the pins. The game is usually an exciting as well as a healthful one, and matches frequently attract many onlookers. The American Bowling Congress has periodic national tournaments at which skillful playing may be seen.

Bowling Green, Ky., a city, the seat of Warren County, at the head of navigation on Big Barren River and on the Louisville & Nashville Railroad, about 115 miles southwest of Louisville. It lies in a fertile agricultural section of the state, raising largely corn, hay, oats, wheat and tobacco, and is a noted center for horse sales and trading. Among its farm stock are also mules and hogs. Settled early in the past century and incorporated in 1812, it has considerable of history, especially during the Civil War era, when it was deemed by the Confederates a place of strategic importance. It is governed, under a charter dating from 1893, by a mayor and city council, the city owning and operating its own waterworks and electric light plant. It has two fine public parks, besides several manufactures, including besides its flour mills, tobacco factories and carriage works. It is the seat of the Ogden School for boys, of St. Columba's Academy and the Western Kentucky Normal School, in addition to its own fine public school system. The population is 9,173.

Boxer Rising at Pekin. An anti-foreign uprising which began in the province of Chili (*chē-lē′*), China, in May, 1900, and lasted until the middle of the following August. The leaders were fanatics known as "Boxers" from the final syllable of the Chinese name which they gave themselves. Among their leaders were Prince Tuan, father of the heir apparent, and the uprising is believed to have been aided, or at least connived at, by the Dowager Empress and the Chinese court. Baron Von Kettler, the German Minister, and the Japanese Chancellor of the Legation at Pekin, were murdered during a two months' siege of that city by the rebels, whose attacks were directed against the foreign legations. A number of marines were landed from the vessels of foreign nations and a large international force was organized, which broke through the walls of Pekin on August 14 and released the besieged. As a result, China was obliged to execute a number of prominent Chinese known to have taken part in the uprising and to pay an indemnity of $300,000,000.

Boy Scouts. An organization of boys for physical, mental and moral development and helpfulness to others, which has reached world wide proportions and has many hundreds of thousands of members. While the name "Boy Scouts" was first applied to an organization formed in England by General Baden-Powell, the General acknowledged his indebtedness for the idea to the work of Ernest Thompson-Seton, Dan Beard and others in this country who, through various organizations, had been interesting boys in high ideals and practical service. The movement is non-military, and its purpose is summed up in the twelve points of Scout law, which require boys to be "trustworthy, loyal, helpful, friendly, courteous, kind, obedient, cheerful, thrifty, brave, clean, reverent toward God and to respect the convictions of others in matters of custom and belief." Boys between 12 and 18 are eligible to membership. Merit badges are awarded for excellence in more than fifty fields. The movement is established in the major countries. In the formation and conduct of local organizations, the scouts work with the local schools, churches and other organizations having a similar purpose. In the United States there are now 24,000 Boy Scout troops. One boy in seven is a Boy Scout. About 165,000 men are actively leading troops now. (See pages 460–469, *How and Why Library*, Vol. 8.)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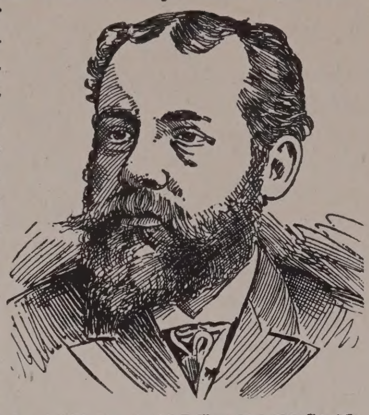
MERIT BADGES
RED SILK LETTERS
SERVICE STRIPES
BOY SCOUTS OF AMERICA
NUMERALS EITHER RED FELT 2" BELOW SEAM OR METAL ON BOTH SIDES OF COLLAR SHIRT KHAKI COLOR
SCOUT AXE
LANYARD
CANTEEN
OFFICIAL BELT
SLEEVE BADGE OF RANK
COOK KIT
BELT HOOK
ROPE
KHAKI COLORED
SCOUT MACKINAW OPTIONAL WITH COUNCIL OR TROOP
SCOUT STOCKINGS KHAKI COLORED
SCOUT SHOES (DARK TAN official BLACK PERMISSABLE)
SCOUT LEGGINGS (OPTIONAL WITH COUNCIL OR TROOP. DARK TAN LEATHER STRAP)

The Boy Scout uniform has been authorized by the Congress of the United States, by an act approved in 1916. The use of the coat is optional (as a Scout may desire). The neckerchief is worn inside the coat, is the troop color, and the standard size is 28 x 32 inches. A scout may wear a four-in-hand tie instead. Material for coat, trousers, etc., is decided by the local council or troop. Thus the expense need not be above the reach of anyone.

Boycotting, a term coined from Captain Boycott, an Irish land agent, to denote a system of organized social and commercial ostracism, familiar in its methods in Ireland, in connection with the land-league and with measures seeking to nationalize the land. The term has since had a wider application, where it represents a combination of persons or political parties, or a concerted action taken by such, to restrain from or prevent business dealings or social relations with another.

Boyesen (*boi′e-sen*), **Hjalmar Hjorth,** a Norwegian poet, novelist and critic, long a resident of the United States, was born in Norway, in 1848, and died at New York, Oct. 4, 1895. After graduating at the University of Christiania, he came to America in 1869, and for a time edited a Scandinavian journal in Chicago, and began to write fiction and verse, in English for the magazines. From 1874 to 1880 he taught

German at Cornell University, and then accepted the chair of Germanic languages and literature at Columbia College, a post which he held until his death. Among his chief works are *A Norseman's Pilgrimage; Gunnar, a Norse Romance; Goethe and Schiller, their Lives and Works; Essays on German Literature;* and a *Commentary on the Writings of Henrik Ibsen.*



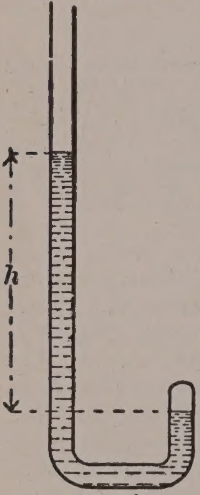
HJALMAR HJORTH BOYESEN

Boyle's Law is an answer to the following question: "Just how does the volume of a given mass of gas vary when the pressure is varied and the temperature held constant?" This query was first definitely answered by Robert Boyle, a distinguished English physicist, in his essay on *A Defense of the Doctrine Touching the Spring and Weight of the Air*, published at London in 1772.

He inclosed a definite mass of air in the closed arm of a U-tube, as shown in the figure. He varied the volume, V, of this inclosed gas by pouring in more and more mercury; and measured the pressures, P, corresponding. In this way Boyle found that so long as the mass and temperature remain constant, the product of the pressure by the volume is a constant. This fact is known as Boyle's law, and may be expressed algebraically as follows:

$PV = \overline{K}$

where K = a constant.



BOYLE'S EXPERIMENT

Boyne, a river of Ireland, emptying into the Irish Channel after a course of about 80 miles. It has been called the Boyne of Science, because of the many institutions along its banks. It is celebrated for its scenery no less than for its historical associations. On its banks was fought, July 1, 1690, the famous battle of the Boyne; in which William III utterly routed James II. An obelisk, 150 feet in height, marks the scene of the battle.

Bozzaris (*bôt'sȧ-rēs* or *bŏz-zăr'ĭs*), **Marco,** a Greek patriot, was born about 1788, at Suli, in the mountains of Epirus. His whole life was spent amid the din of battle. Driven from Suli, he united with a number of other refugees in the Ionian Islands against Turkey, and entered first the French service. In 1820 Ali Pasha, an Albanian, took arms against Turkey, and Bozzaris, with several hundred followers, joined him and won several victories. After the death of Ali Pasha, Bozzaris carried on the war for a while successfully. Later he became a general in the Greek army. When this army withdrew to Missolonghi, Bozzaris skillfully defended the place. In 1823 a Turkish army of 13,000 marched against the Greeks, and Bozzaris led 1,200 men to meet it. On August 20 he came upon the camp of the vanguard of the enemy, 4,000 strong. At night, leading 350 men, he burst upon his startled foes, and routed them with great slaughter. Bozzaris was killed while leading his men to the final attack, in Aug., 1823. The story of this heroic fight has been told by Fitz-Greene Halleck, in his poem, *Marco Bozzaris.*

Brabant (*brä'bant*), a district in the lowlands of Holland and Belgium, and now forming parts of these two kingdoms. In the course of its history it has had many masters. In 1814, by the treaty of Paris, it became a part of the Netherlands, and was divided in 1830 into the provinces of North Brabant, South Brabant and Antwerp. The Belgian revolution, in 1830 left North Brabant with the Netherlands, while the other two parts fell to Belgium. North Brabant (area, 1,980 square miles), with 'sHertogenbosch as its capital is a little larger than Rhode Island, and has a population of 597,538 South Brabant, somewhat smaller in size (area, 1,268 square miles), has over one and a quarter million people, speaking Flemish, and is one of the most densely inhabited countries in Europe. It is highly cultivated, and has important manufactures. Its capital is Brussels. Brabant or Brussels lace is well known. See ANTWERP.

Brace, Charles Loring, an American author and traveler, noted for his benevolent labors, was born at Litchfield, Conn., in 1826, and died in the Tyrol, Switzerland, Aug. 11, 1890. He worked among the lowest classes in New York, and was the founder of the Children's Aid Society in 1853, which has provided country homes for over 60,000 children. He traveled considerably in Europe, studying especially reform schools and prisons. He published several volumes of *Travels, Short Sermons for Newsboys* and a work on *The Dangerous Classes of New York.*

Bract, a general name applied to leaves, usually much reduced, which occur in a flower cluster. The word is somewhat extended in application by calling any reduced leaf-like body bract-like. For example, the sepals of a flower are often spoken of as bract-like.

Braddock, Edward, a British general, was born in Perthshire, Scotland, in 1695. He received a military education and became a member of the famous Coldstream Guards. In 1745 he took part in the battle of Fontenoy. He was sent to America in 1755 during the French and Indian War, as commander-in-chief of the forces in the upper Ohio Valley. He led an expedition against Fort Duquesne (now Pittsburgh, Pennsylvania). With him as aide went George Washington, then Colonel, who warned Braddock of the Indian methods of fighting. Benjamin Franklin, who was procuring supplies for the army, also offered suggestions to the British general, but he scorned to accept advice from an American. He found their informality and lack of military discipline deplorable, as he believed only in the regular English style of warfare, and moved his men as if on the broad English roads. Captain Jack, the best scout and Indian fighter in the country, refused to accompany the expedition as guide, because Braddock insisted on subjecting him to regular military discipline. The expedition started early in June, and spent a month making roads and bridges before arriving near the fort. Part of the force of 2,150 men and part of the supplies were left behind at Little Meadows. Braddock advanced to the Monongahela River with 1,200 picked men on the morning of July 9, and turned aside from the river to ascend a ravine. The way was blocked by French soldiers, and Indians lay in ambush along the wooded sides of the ravine. The battle which followed took its toll of more than half of General Braddock's men, and mortally wounded General Braddock himself.

Braddock, a thriving manufacturing town in Allegheny County, Pennsylvania, is situated on the right bank of the Monongahela River, ten miles southeast of Pittsburgh. It is the site of the disastrous battle between English and Colonial forces under General Braddock, and the French and Indians, on July 9, 1755. Its industries include steel rail, wire, cement, plaster and railroad car manufactures. It is noted as the city to establish the first Carnegie Library in the United States. In 1930 the population was 19,329.

Bradford, an important English manufacturing town, is situated on a tributary of the Aire River, in Yorkshire, 190 miles from London. It became a city in 1897 and sends three members to Parliament. It is noted as the chief seat in England for the manufacture of worsted yarn, and is a famed market for the long wools used in worsted fabrics, for worsted coating, and velvet and plush industries, alpaca and mohair. Coal and iron mines are situated in the vicinity, machinery is manufactured and there are important stone quarries. The city now has over three hundred mills, and many fine buildings, monuments and parks. One of the most interesting buildings is the town hall, of medieval design, with campanile tower and carillon chimes. The first English temperance society was founded here. According to the census of 1931 Bradford had a population of 298,041.

Bradford, a city in McKean County, Pennsylvania, is situated near the southern boundary of New York, sixty-five miles south of Buffalo. It is in the heart of the oil and natural-gas region, having been since 1876 one of the most important oil centers in the state. It is served by several railroads. Extensive manufactories are located at Bradford, including oil well supplies, machine shops, tile and terra cotta works and chemical works. The population in 1930 was 19,306.

Bradford, Gamaliel, a distinguished American essayist, poet and biographer, was born at Boston, Massachusetts, on October 9, 1863. He was a direct descendant of Governor William Bradford of Plymouth Colony. Illness interrupted his education, but he received an LL.D. from Washington and Lee University. He called himself a "psychographer." Gamaliel Bradford will always be especially remembered for his unique biographies, chief among which are *Lee, the American; Damaged Souls; Daughters of Eve,* and *The Quick and the Dead.* He died in 1932.

Bradford, Roark Whitney Wickliffe, an American author, was born in Laureldale County, Tennessee, on August 21, 1896. He was educated at the University of California. During the World War he served as first lieutenant of coast artillery. After the Armistice he held several post-war assignments until March, 1920. In that year he entered upon a career of journalism and became Sunday editor of the New Orleans *Times-Picayune.* He later turned his entire attention to authorship. He won the O'Brien Prize Story Award in 1927 with *A Child of God.* In 1928 the Pulitzer Prize was awarded Marc Connelly for the best play of the year, *Green Pastures.* Connelly and critics, however, gave the glory to Roark Bradford for it was his *Ol' Man Adam and His Chillun* (1928) upon which the play was based. Among Bradford's other important works, nearly all of which are concerned with Negro life, are: *This Side of Jordan* (1929); *King David and the Philistine Boys* (1930), and *John Henry* (1931).

Bradford, William, one of the Pilgrim Fathers, was born in Yorkshire, England, in 1590. He went to Holland for religious freedom, where he joined the Leyden congregation, and sailed for America in the Mayflower in 1620. He was elected governor of Plymouth Colony to succeed Carver in 1621, and, with the exception of five years when he refused re-election, he held the position for thirty-one years, until his death. He wrote a *History of the Plymouth Plantation,* from the formation of the organization in 1602 until 1647, on which all later accounts are based. He died in 1647.

Braganza (*brä-gän sä*), (or **Braganca**), **House of,** a ruling dynasty of Portugal, originally Dukes of Braganza. The family takes its name from the town of Braganza, where Alfonso de Portugal was created Duke in 1442 by his brother Pedro, then regent for Alfonso V.

In 1640, in the person of John IV, this family came to the throne, and won independence from Spain which had taken possession of Portugal through Philip II in 1580. The House of Braganza died out in the male line, after founding the Imperial line of Brazil.

Bragg, Braxton, a Confederate general, was born in Warren County, North Carolina, in 1817. He was graduated at West Point in 1837. From 1837 to 1839 he served in the Seminole War. During the Mexican War, 1841-42, he was promoted several times for gallant conduct. After the close of the war he became a sugar planter in Louisiana. At the opening of the Civil War he joined the Confederate Army in which he held several important commands, rising to the rank of general. After the battle of Shiloh he was placed in command of the Army of the Mississippi. He defeated General Rosecrans in the famous battle of Chickamauga, on September 19-20, 1863. He himself, however, was defeated by General Grant at Chattanooga on November 23-25. He was replaced by Hardee on December 2. During the administration of President Davis, General Bragg acted in the capacity of military adviser to the Chief Executive. Later he was in command of the Department of North Carolina, and in February, 1865, was assigned to active service under J. E. Johnston, with whom he remained until Johnston's surrender. After the war, he was for some time chief engineer for the State of Alabama, and as such had charge of the improvements in Mobile Bay. He died in 1876.

Bragg, Sir William Henry, a British physicist, was born in Wigton, Cumberland, on July 2, 1862. He was educated at King William's College, the Isle of Man, and Trinity College, Cambridge. He was Professor of Mathematics and Physics at the University of Adelaide, South Australia, from 1886 to 1908. It was while there that he began his extensive and extremely important studies in the modern fields of radioactivity, X-rays and the structure of crystals. He was appointed Cavendish Professor at Leeds University and served in that capacity from 1909-1915; he was Quain Professor of Physics in the University of London from 1915 to 1923. In 1923 he was appointed director of the Royal Institution of Great Britain, and later became Fullerian Professor of Chemistry there, and director of the Davy-Faraday Research Laboratory. In 1928, he was elected president of the British Association for the Advancement of Science.

His most outstanding contribution to science has been in putting crystallography on a foundation that is exact and measurable. He derived what is known as the "Bragg equation," a formula for space lattices. He constructed an X-ray spectrometer, and used the Bragg equation with it to determine the various distances between the atomic planes in crystals, and the nature of the atoms in these planes. His discoveries were of such a fundamental nature that his name became a household word to all the students pursuing the exact sciences.

He was awarded, with his son, William Lawrence Bragg, the Barnard Gold Medal of Columbia University in 1914, and the Nobel Prize in 1915, for work on X-rays and crystals. He also received many honors, memberships, medals, and honorary degrees, from scientific societies and universities in England, and also in various other countries. He wrote many scientific papers for periodicals, and his published works include *Studies in Radioactivity*, 1912; *X-rays and Crystal Structure*, (with W. L. Bragg) 1915; *The World of Sound*, 1922; *Concerning the Nature of Things*, 1925; *Creative Knowledge*, and *Old Trades and New Science*, 1927; *The Universe of Light*, 1933.

Bragg, William Lawrence, a distinguished British physicist and son of the famous Sir William H. Bragg, was born in Adelaide, South Australia, on March 31, 1890. He received his education at St. Peter's College, Adelaide, the University of Adelaide, and Trinity College, Cambridge. From 1915 to 1919 he was technical adviser on sound ranging to the map section, Q.H.G., in France. In 1919 he was appointed Langworthy Professor of Physics at Victoria University, Manchester.

His work in the main has been concentrated in the carrying out of the ideas of his father, the celebrated Sir William Bragg, with whom he received the Barnard Gold Medal of Columbia University in 1914, and the Nobel Prize in 1915. In 1931 he received the Hughes Medal of the Royal Society. He started further investigation along the two very fruitful lines of the measurement of the X-ray wave, on which Mosely worked, and the lengths and elucidation of crystal structure in which field he extended the knowledge of crystals, and of the interatomic distances and linkages. He laid the foundations for a chemistry of the solid state, through his experiments. He is the author of a number of scientific papers on crystal structure, and aided his father in the preparation of *X-rays and Crystal Structure*, 1915.

Brahe (*brā* or *brä*), **Tycho**, an illustrious Danish astronomer, distinguished above all else for his observations and for the invention of various astronomical instruments. Bessel has called him *König unter den Astronomen*, "king of astronomers." He was born at Knudstrup, near Helsingfors, on the island of Schonen, on December 14, 1546. He was educated at the University of Copenhagen, whither he went in 1559, and at Leipsic. The aggressiveness which characterized his entire life is illustrated by the fact that at the age of twenty he found himself in a quarrel which later led to a duel that cost him a part of his nose. His tastes led him quite as strongly in the direction of chemistry—or pyronomy, as he called his science—as in the direction of astronomy.

The remarkably brilliant new star which made its appearance on November 11, 1572, seems to have had some influence in giving bent to his energies, although he had always been keenly interested in astronomy; for while yet a lad he had saved enough pocket money to purchase a copy of Ptolemy's works, published at Basel in 1551.

At the age of 37, Brahe was placed in possession of a superb astronomical observatory, which had been built for him by King Frederick II of Denmark on the island Hven. Besides two towers 75 feet high, this observatory included a library, a residence, a chemical laboratory, a mechanical workshop, a printing office, a paper mill and the necessary farm buildings. To the entire outfit he gave the name of Uranienborg. Here he spent seventeen years in active observation. This observatory was completely destroyed in 1652. A change of rulers in Denmark brought disaster to Brahe and caused him to remove to Prague, where he was again established in a good observatory by Kaiser Rudolph II, and was assisted by his distinguished pupil, John Kepler.

To Brahe we owe the method of determining latitude by measuring the upper and lower culmination of a star, a vastly more accurate method than that used by Copernicus, viz., observations on the sun in meridian

We owe to him also a star map and the discovery of several new features in the moon's motion.

Brahe was not, as has sometimes been reported, an opponent of the Copernican system; but he saw that the ideas of Copernicus needed modification before they could be made to fit the then present state of knowledge. In estimating his work we must remember that it was all done before the invention of the telescope, before Kepler's laws were discovered, and before any physical connection (which we now call gravitation) between the sun and planets was dreamed of, much less studied and accurately described, as was done later by Newton.

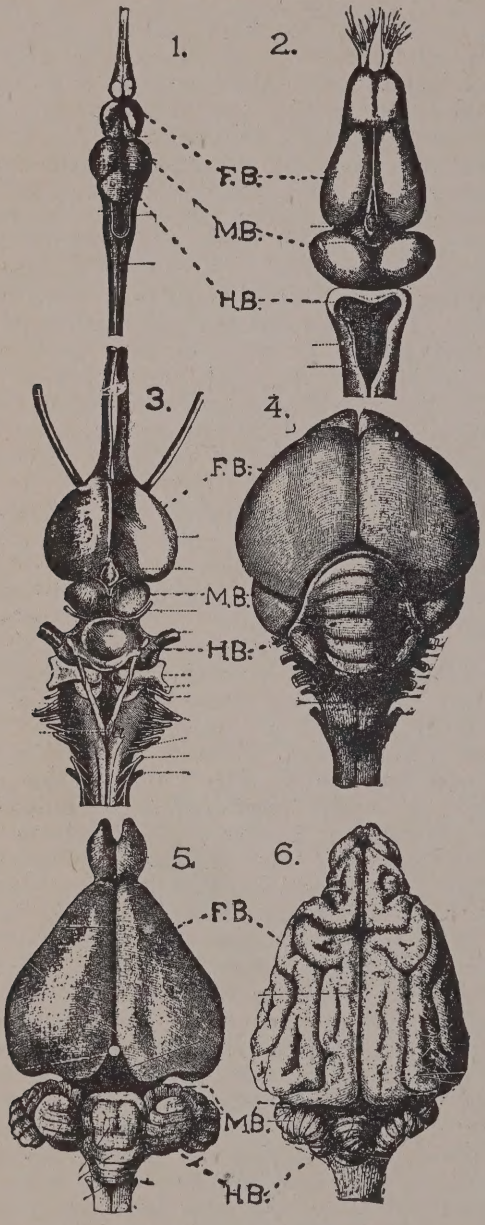
Brahma and Brahmanism. See India.

Brahmaputra (*brä'mȧ-pōō'trȧ*), meaning "son of Brahma," one of the largest rivers of India, rises in Tibet. After a course of probably 1,800 miles, together with the Ganges, it empties into the Bay of Bengal, through a vast delta. During the rainy season it floods an area of hundreds of square miles, and makes fertile vast plains, which yield an abundance of rice, jute and mustard. Boats can ply upon its waters for 800 miles, and a vast traffic is carried both up and down the river. Europeans became acquainted with the river in 1765.

Brahms (*brämz*), **Johannes,** a notable German pianist and composer, was born at Hamburg, in 1833, and died at Vienna, April 3, 1897. His musical compositions are chiefly orchestral, though to the educated lover of music his choral compositions take by far the higher place. He has been styled the modern Beethoven, and by others is deemed the great rival of Wagner. He is more popularly known, however, by his many songs, ballads and choruses.

Brain, the seat of mental life and voluntary action. It is therefore the most interesting organ of the body. The brain and spinal cord, taken together, are called the central nervous system, for they form a sort of central axis, from which nerves pass to the various parts of the body and to which nerves lead from the surface. The brain of the higher animals is so much changed by growth and development that it is very difficult to understand. It has undergone so many changes in the course of evolution, that we must examine the brains of the simpler vertebrates in order to see what they were like before they became so modified. A glance at the accompanying sketches will tell more than words. It shows the general nature of the changes to be growth in size and complexity of the cerebral hemispheres, and we can see also that a series of brains merge by small changes into one another, so that the simplest and most complex are connected by intermediate forms.

The sketches represent the brains of various animals seen from above after removal from the cranium. In the brain of the perch (Fig. 1), the parts are all arranged in a row or line. The part marked *F. B.* is, in all the figures, that part of the fore-brain called cerebral lobes. In Fig. 1, they are smaller than the lobes of the mid-brain (*M. B.*). The latter are also called optic lobes. Behind these is a single lobe marked *H. B.*, which is the *cerebellum* or main part of the hind-brain. (The complete hind-brain embraces the *cerebellum* and the *medulla oblongata.*) In the frog (Fig. 2), the relative size of parts has changed. The cerebral lobes (*F. B.*) are now larger than those of the mid-brain. The lobes in front of the cerebral lobes are in all the sketches, the olfactory lobes, connected with the nerves of smell. The difference in size between the central lobes and those of the mid-brain, is more marked in the brain of the alligator (Fig. 3). In the pigeon (Fig. 4), the increase, relatively, in size of the cerebral lobes is much greater; they have expanded till they are now in contact with the cerebellum, and the lobes of the mid-brain are partly covered. The same line of modification is carried further in the brain of the rabbit (Fig. 5). Here the cerebral lobes are very large when compared with those of the mid-brain, and the cerebellum is ringed or divided into segments. Note, now, that the surface of the cerebral lobes is smooth in the rabbit and the bird, but in the dog (Fig. 6), we have a new development; the surface of the fore-brain is thrown into convolutions. It is easy to go from this condition to that in the human brain, in which the cerebral lobes are so large that they cover the cerebellum. When the human brain is looked at directly from above, we can see only the cerebral lobes; all the other parts are covered, and the surface is much more convoluted than in the case of the dog's brain. Therefore, the line of change in brain, from simpler to higher forms, has been the great expansion of the cerebral lobes, and there have also been internal changes.



1—BRAIN OF PERCH
2—BRAIN OF FROG
3—BRAIN OF ALLIGATOR
4—BRAIN OF PIGEON
5—BRAIN OF RABBIT
6—BRAIN OF DOG

The outer layer of the central lobes is called the cortex. It consists of gray matter which under the microscope is made up of an immense number of nerve cells, arranged in layers. Nerve fibres lead away from the nerve-cells, and serve to carry the impulses that arise within the latter. Just as electricity generated in a battery cell may be carried away by wires, so the nervous energy that arises in the nerve-cell is carried away by the nerve fibre. The many fibres leaving the cortex serve to connect it with other parts of the brain, and also with the tissues of the body. Bundles of fibres form fibre-tracts, which pass into the spinal cord, and from which smaller bundles of fibres run in the nerve trunks and are distributed to muscles and all other tissues of the body. These are motor, secretory nerves, etc. Similar groups of fibres run in the opposite direction from the surface of the body inward. These are sensory fibres.

It is extremely interesting to know that certain groups of nerve-cells in the cortex preside over particular movements and particular activities of the body. The entire outer surface of the brain has been explored by use of the electrical current and divided into territories called areas. The stimulation of a particular area, for example, will cause movements of muscles of the leg (see sketch), that of an adjacent area, movements of the arm, etc. The diagram shows the parts of the cortex connected with the leg, arm, face, tongue, larynx, with hearing, sight, speech, word-blindness and sensation. Any disorder or deficiency in the cortex of these areas makes disturbances or disorders of the muscular movement, or the sensations connected with them.

The cerebellum, likewise, contains clusters of nerve-cells, which connect with fibres, and regulate a large number of muscular movements. The medulla oblongata contains clusters of cells called centers, which control and regulate breathing, action of the heart, swallowing, movements of the stomach, the blood supply to different parts, etc. Any injury to the medulla is, therefore, very serious.

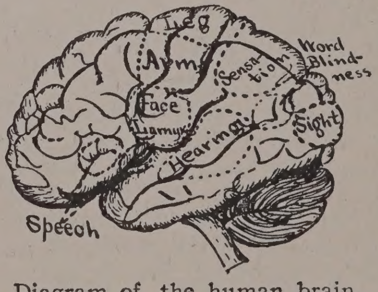
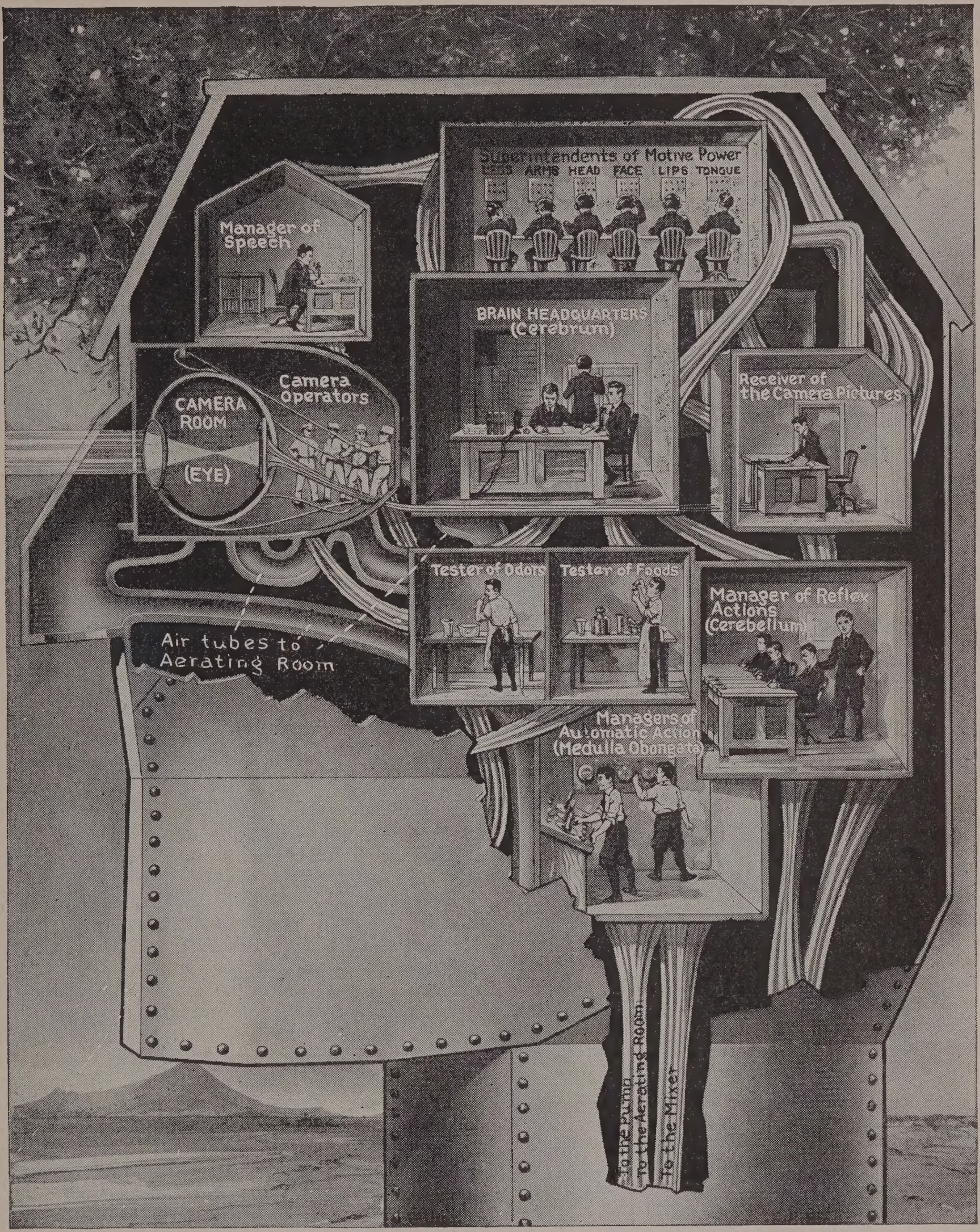


Diagram of the human brain, showing area of the cortex

Some of the most interesting recent experiments show that the nerve-cells undergo changes, that can be detected by the microscope, similar to the changes in the cells of glands and other tissues, when they are active. This brings the activity of the central nervous system into line with that of other physiological processes.

A LOOK INTO THE EXECUTIVE OFFICES


Superintendents of Motive Power
LEGS ARMS HEAD FACE LIPS TONGUE
Manager of Speech
BRAIN HEADQUARTERS (Cerebrum)
Camera Operators
CAMERA ROOM
(EYE)
Receiver of the Camera Pictures
Tester of Odors
Tester of Foods
Manager of Reflex Actions (Cerebellum)
Air tubes to Aerating Room
Managers of Automatic Action (Medulla Obongata)
To the Pump
To the Aerating Room
To the Mixer

Here we are in the executive offices of the mechanical man. Notice how the central office, the cerebrum, is connected with the offices of the various assistant managers. From the head office is supervised everything except the digestive and pumping departments, which are taken care of by the managers of automatic action. One of the most curious things about this mechanical man is that he looks, so to speak, with the back of his head. The pictures are taken through the eye, to be sure, but we do not know that we are seeing anything until the report reaches the office of the receiver. In a similar way the imaginary little people in the departments of taste and smell receive these sensations and like the pictures, they are placed on file; that is to say, we cannot only taste and see things at the time, but can remember how things taste and smell and how they look. The department of hearing could not be shown in this picture because it is just on the other side of the department of taste.

See Edinger: *Anatomy of the Central Nervous System*, etc. (1899); Ferrier: *Functions of the Brain;* and Barker: *The Central Nervous System* (1900). Wm. A. Locy.

Brai'nerd, David, one of the earliest missionaries to the American Indians, was born in Connecticut in 1718. He labored among the Indians of Massachusetts, Pennsylvania and New Jersey with much success. He died in 1747, while still a young man, at the house of Jonathan Edwards, who has written an account of his life.

Brainerd, Minn., a city, the seat of Crow Wing Co., on the east or left bank of the Mississippi River, 136 miles northwest of Saint Paul and about 100 miles west of Duluth. It is on the Northern Pacific and the Brainerd & Northern Minnesota Railroad. Water power for its main industries is mainly from the Mississippi, and its chief manufactures comprise, besides the car-works and machine shops of the Northern Pacific R. R., lumber and flour mills, foundries, breweries and cigar factories. A United States signal station is located here, and the city has besides a public park and athletic grounds, a lumberman's hospital, court-house and the buildings of the Y. M. C. A. The city was chartered in 1883, and is governed by a mayor and city council. It has a population of 10,000.

Brake (car), a device for stopping a car. All practical brakes act by friction, blocks of metal called shoes being pressed against the rims of the wheels. They differ in the method of forcing these shoes against the wheels. The older method was by hand power, the force being transmitted from a wheel through a chain and system of levers, but as the speed of trains increased, quicker and more powerful brakes were required. For high speed trains, the brake must act practically at the same time on every wheel on the train, that is, it must be continuous, and also be capable of being controlled by the locomotive engineer, so that the train can be controlled quickly from one point. A point of safety is that the brakes must act automatically in case of accident, such as in case of the breaking of the connections of the train. Four kinds of power have been used for such continuous brakes: mechanical, hydraulic, electromagnetic and air. Air brakes have proven themselves to be so superior to all others that they are the only brakes having extensive use to-day. Air brakes are of two kinds: vacuum and compressed air brakes. The vacuum is produced by a form of injector placed on the locomotive, which partially exhausts cylinders or bellows placed under car. The atmospheric pressure then compresses the bellows or forces in the piston of the cylinder, and this acts on a mechanism which puts on or off the brakes. In some systems, as in the Saunder's vacuum brake, the brakes are on normally, and they are held off by the atmospheric pressure as long as the vacuum is maintained. In other brakes, exhausting the air throws on the brakes. The air brake used more extensively than any other is the Westinghouse quick-action automatic air-brake. This acts by compressed air produced by a compressor on the locomotive. The compressed air is stored in a tank on the tender of the locomotive, and from thence distributed by flexible connections and pipes to the brake cylinders placed under each car of the train. The action of this brake is quick and powerful. In its improved form, the action travels with a high velocity, so that with a train of fifty cars, having a length of 1,900 feet, the action takes place at the last car in 2¼ seconds after application at the first car. The theoretical velocity possible is that of the velocity of sound in air, and that would take 1¾ seconds to travel the 1,900 feet, so that the action of the automatic brakes is almost perfect.

Branch'ing. A branch is a repetition of the axis from which it springs. There are two prominent forms of branching. One is known as dichotomous, and is chiefly characteristic of the lower plants. It consists in the division of the apex of the axis into branches, usually two in number, as the name indicates. In cases of dichotomy, therefore, an axis stops where it branches. The other type is known as monopodial, and consists in giving off branches from the side of the axis, which itself continues to develop. This is the type more characteristic of the higher plants.

Brandeis, Louis D., lawyer, was born in Louisville, Ky., November 13, 1856, admitted to the bar in 1878, and until his appointment as Associate Justice of the United States Supreme Court in 1916, practiced in Boston. Among the cases which brought him a national reputation was that of the advanced freight investigation before the Interstate Commerce Commission in 1911, in which he appeared for the shippers; suits relating to the constitutionality of laws limiting hours of labor for women, and in opposition to the New Haven monopoly of transportation in New England. He has written extensively on public franchises, wage earners' life insurance, the scientific management of labor problems, and other social economic subjects.

Bran'denburg (*brăn'den-bo͝org*), a central province of Prussia, which formed the starting point of the present kingdom. Its area is 15,383 square miles, one and a half times the size of Maryland. The population is 4,092,616, largely Protestant. Brandenburg came into the possession of the Hohenzollerns, the present ruling family of Germany, in the 15th century. Later it was joined to the duchy of Prussia, and in 1701 the Hohenzollerns became the kingly line of Prussia, and in 1871 the imperial family of Germany. Berlin is the capital of Brandenburg, as it is also of Prussia and of Germany. The town Brandenburg is on the River Havel, 35 miles west of Berlin. Population, 51,239.

Brandes (*brän'dēs*), **Georg Morris Cohen,** Danish literary critic and man of letters, was born at Copenhagen in 1842 and educated at its university. He and his brother Carl (a notable Danish dramatist) are of Jewish extraction. Prof. Brandes spent his early life in France and Germany, and published works entitled *Æsthetic Studies, Criticisms and Portraits* and *French Æsthetics in Our Day.* Returning to Denmark, he delivered lectures at the University of Copenhagen, which were published under the title of *Main Currents in the Literature of the 19th Century* This work, owing to its radical thought, made him enemies in Denmark and led to his settlement once more in Berlin. Later on there came from his pen a work on *The Danish Poets*, a clever piece of psychological analysis; *Impressions of Poland; Impressions of Russia; A Study of Ibsen;* Lives of *Ferdinand Lassalle* and *Benj. Disraeli; Men of the Modern Revival;* and *Wm. Shakespeare, the Man and His Works*, an elaborate study of the great poet.

Brandon, the second city in importance in the province of Manitoba. Population, exceeds 10,500, having doubled in five years. It is situated at the junction of the Little Saskatchewan and Assiniboine Rivers, 132 miles west of Winnipeg, and on the main line of Canadian Pacific Railway. It was founded in 1880, taking its name from the Brandon Hills situated about eight miles to the south. It is rapidly growing in commercial importance.

Bran'dy is the liquid obtained by distilling grape wine. It is generally made from white and red wines, and the different wines used give their peculiarities to the brandy. Wines which have the most alcohol yield the most brandy. The best brandy (Cognac) is made in the department of Charente, France, and is known as cognac and armagnac, from the names of the towns where it is manufactured. Catawba brandy, made from the Catawba wine of Ohio, is very good, as are the brandies made from the California grape. A liquor called brandy is sometimes made from the juice of other fruits besides the grape, known as peach brandy and cider brandy or apple-jack. Pure brandy consists almost entirely of alcohol and water. It has no color when fresh, but burnt sugar is usually added to give its wine-color.

Bran'dywine, the name of a creek in Pennsylvania, flowing southeast into Delaware, and emptying into Christiana creek at the city of Wilmington. It is known as the site of the battle of the Brandywine, which was fought on its banks, September 11, 1777. The Americans, 13,000 strong, under Washington, were defeated by a force of 18,000 British, under Lord Howe.

Brant, Joseph, a leader of an Indian tribe, friend and ally of the British, was born in 1742 His ancestors lived in the Mohawk Valley. The name of his foster father was Brant. He visited England in 1775 at a time when the Six Nations were hesitating as to whether they would join with the colonials or the British in the Revolutionary War, when he received much attention. On his return he energetically and bravely espoused the British cause, winning distinction for his valor. Brant was a humane Indian, and his admirers have warmly resented the statements contained in Campbell's *Gertrude of Wyoming*, in effect accusing the Indians of wanton cruelty. After the war the lands of the Six Nations passed into other hands, and they were given by way of compensation a strip six miles wide on each side of the Grand River (Ontario) from its mouth to the source. Some of them settled in the Bay of Quinté district in eastern Ontario. In 1785 there were 700 of the Six Nations settled in the County of Brant. Now there are 4,000. The old Mohawk church (Anglican), the first church erected in upper Canada, built in 1786, is on their reserves. His great-grandson was one of the speakers at the centennial U. E. Loyalists celebration held in Adolphustown (eastern Ontario), in 1884. Brant translated the Gospel of Mark and the English prayerbook into the Mohawk language. He died in 1807, and a monument, with a large bronze statue above it, has been raised at Brantford, Ontario, Canada, in his honor.

Brant'ford. City of 21,964, situated on the Grand River, 25 miles west of Hamilton, called after the Indian Joseph Brant, whose body is buried in the old Mohawk church, two miles from the city. It is the headquarters of the consolidated Six Nations. The noted inventor, Alexander Graham Bell, lived here for many years, and a handsome memorial has been erected in his honor. It is sometimes called the telephone city, and is favorably known as a manufacturing center. It is on the main line of the Grand Trunk Railway, served also by the Toronto, Hamilton & Buffalo Railway, less than two hours from Toronto. Public buildings, schools, and churches are very attractive.

Brass, an alloy of copper and zinc. It is made by several processes. The most common method is to melt the copper first and then put in the zinc. Brass is used in many ways in the arts, on account of its ease in working and its color. It is harder than copper, but can be easily worked. It is readily cast, rolled, stamped and worked in various other ways. Different varieties are made by varying the proportions of the two metals. Ordinary brass contains about seventy parts of copper and thirty of zinc. Yellow metal contains more zinc. It is rolled into sheets and used for sheathing ships. Tombac, prince's metal, mosaic gold, etc. are among the numerous varieties. By adding tin, brass is made stronger; while lead makes it harder, so that it can be more readily worked in the lathe. Brass can be cleaned with nitric acid.

Brassey, Lady Anne, wife of Lord Thomas and a great traveler, accompanying her husband in his tours in the yacht *Sunbeam,* was born in 1840, and died at sea, Sept. 14, 1887. She is the author of the delightful *Voyage in the Sunbeam,* published in 1878; of a cruise to Cyprus and Constantinople, described in *Sunshine and Storm in the East;* and of a later work, *In the Trades, the Tropics and the Roaring Forties.*

Brassey, Thomas, Lord, an English political economist and authority on seamanship, was born in 1836 (the son of Thomas Brassey, the great contractor, whose *Life* was written by Sir Arthur Helps) and educated at Rugby and at Oxford. He entered English political life in 1865, and from 1880 to 1885 he was civil lord of the admiralty in Mr. Gladstone's administration and afterward secretary to the admiralty. From 1895 to 1900 he was governor of Victoria, Australia. He was known as an enthusiastic yachtsman, interested in the British seamen, a writer on the British navy; and in 1893–95 was president of the Institute of Naval Architects. His chief writings are a treatise on *Works and Wages; The Eastern Question; English Work and Foreign Wages;* and *The British Navy* (in 5 volumes). He died in 1918.

Brattleboro, Vt., a town in Windham County, on the Connecticut River, about 60 miles north of Springfield, Mass., reached by the Central Vermont and the Boston and Maine Railroad. The town dates from the middle of the 18th century and has an interesting early history, while it occupies a picturesque site. Besides its civic buildings it has a public library and is the seat of the state asylum for the insane. Among its manufactures is the factory of the Estey parlor-organs; its other establishments are furniture and toy-making factories and those producing children's carriages, wagons and canning machinery. Maple-sugar is also a product of the industries of the town. Population (census 1910), 7,541.

Brazil, Ind., a city, the seat of Clay County, 57 miles west southwest of Indianapolis and about 20 miles east of Terre Haute, on the Wabash River. It is reached by the Chicago & Eastern Illinois Railroad, the Evansville & Terre Haute system and other railroads. The city has a public library, and owns and operates its own water-works. Its industries, aided by the extensive deposits of block-coal, clay and shale of superior quality in the neighborhood, include sewer-pipe and other clay products, brick and tile works, the manufacture of pig iron, boilers, mining engines, steel rails and a variety of other machinery. Brazil dates from about the year 1856, and was incorporated as a city in 1878. Population, 10,315.

Brazil, The United States of. The largest state of South America and the third largest political division of the western continent. It has the Atlantic on the east and northeast, with a coast line of 5,000 miles. Its land frontier of 10,000 miles confronts all the other South American states except Chile. Its breadth is 2,705 miles, its length 2,660 miles, and its area 3,218,991 square miles. It is larger than the United States, excepting Alaska. It occupies nearly one half of the South American continent.

Surface and Drainage. Lying like a vast triangle in the eastern angle of the continent, Brazil falls naturally into two sections. The eastern and southern portions are high, containing two mountain ranges, with an enclosed elevated plateau. The northern and western section consists of plains and lowlands, including the valley of the Amazon.

Brazil's unique feature consists of the most remarkable system of water-ways on our planet. Three great river systems drain the country, the Amazon, the Plata and the San Francisco. The mighty Amazon alone, with its branches, drains fully one half of Brazil. The rainfall of the South American continent is heaviest in the interior on the head waters of the Amazon, so that this river is already a stream two miles wide and 150 feet deep where it first enters Brazilian territory, 2,300 miles from its mouth. With its tributaries it affords 27,000 miles of navigable water. The Madeira, the longest tributary, gives access to Bolivia. The Rio Negro, the largest northern affluent, connects with the Orinoco and thus furnishes navigation into Colombia and Venezuela. Another extensive and important system is the Paraguay and its branches, which terminate in the Plata. The San Francisco, which flows directly into the Atlantic, gives, with its tributaries, 4,400 miles of navigation.

Transportation. The great rivers above named give abundant access to the interior of the country, and this fact is the more important because large areas must otherwise remain inaccessible, being not adapted to the building of railways. Brazil has 14,000 miles of railways and these have been confined largely to the seaboard sections, but are now being extended into the interior.

Climate. Nearly the whole of the area of Brazil lies within the tropics, less than ten per cent. being in the temperate zone. With the heavy rainfall, especially in the western portion, there is thus a combination of heat and moisture which results in rank growth of vegetation. In the extreme southern sections the four seasons are fairly marked; elsewhere they consist only of the wet and the dry season.

Natural Resources. Brazil is an agricultural country. Vegetation is rich and varied. The forests, especially in the Amazon valley, have an amazing growth, and abound in animals, birds and plants. The rivers are full of fish and reptiles. In the valley-region development of the country has been hindered by the almost uncontrollable luxuriance of vegetation, which the meager population has been unable to subdue and hold in check. Brazil has more varieties of plants than any other country in the world. Her forests have a great variety of valuable woods, including rosewood, mahogany, satinwood, oak, pine and many others.

Brazil furnishes more than 60% of the world's coffee and more than 50% of the world's rubber. Other important products are sugar, tobacco, cotton, rice, mate, cocoa and nuts. Among her fruits are pineapples, oranges, mangoes and grapes. In southern Brazil the cattle industry is important. The mineral resources of Brazil have not been largely developed, but there are deposits of coal and also gold, silver, lead, zinc, iron, copper and other minerals.

Manufactures. Manufactures are not largely developed, but are on the increase. There are more than a hundred cotton mills, also woolen factories, with silk mills, flour mills, etc.

Government. The United States of Brazil are a federal republic, the constitution being formed after the pattern of the United States. There are twenty states and one federal district. The national Congress consists of a senate and chamber of deputies.

Inhabitants. The population is about 30,000,000, less than half being of European descent. The language, unlike that of the rest of South America, is Portuguese. There are over 4,000,000 immigrants, chiefly Italian, Portuguese, Spanish and German. The religion is Roman Catholicism. The federal government pays the salary of the prelates, but has declared absolute freedom for every form of religion.

Education. Education is under state control, primary education being free but not compulsory. In Rio de Janeiro there are polytechnic schools, law schools, normal schools, a school of war, a college of marines and a naval academy. Other cities are provided with similar schools, but on the whole the standard of education is low, four out of five of the population being illiterate.

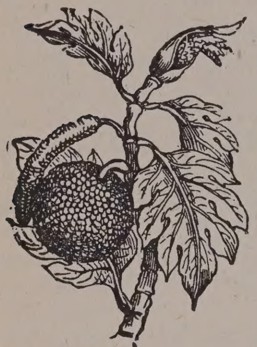
History. Brazil was discovered in 1500 by the explorer Pinzon, and thirty years later the Portuguese began to plant colonies along its coast. Their selfish and greedy policy long delayed the progress of the country. In 1808 the royal family of Portugal, the house of Braganza, being expelled by the French, took refuge in Brazil, and their stay was marked by great growth in the country. On their return the king's eldest son was left as prince regent, but soon afterward, in 1822 he declared Brazil independent, and was crowned emperor as Dom Pedro I. Worn out with the cares of rule, he abdicated in 1831, and for nine years regents guided the affairs of the empire, until in 1831 Dom Pedro II, at the age of 15, was crowned emperor. Except a few insurrections, his reign was peaceful, until the revolution in November, 1889, when the empire became a republic. The ex-emperor was kindly treated and provision made for his support, though for fear of trouble from his presence he was sent to Portugal. The capital of Brazil, its largest city and most important seaport, is Rio de Janeiro. Population (estimated), 2,000,000. The other chief towns are Bahia (400,000), Pernambuco (300,000), Sao San Paulo (800,000).

Brazos (*brä'zōs*), formerly called Brazos-de-Dios, is a large river in Texas. It rises in the elevated region of the northwest that once was called the *Llano Estacado* or Staked Plain, and flows southeastward between Colorado and Trinity Rivers. After a course of about nine hundred miles it falls into the Mexican Gulf, forty miles southwest of Galveston. During the wet season it affords 300 miles of steamboat navigation. The cotton plantations along the river are highly productive. About midway between the source and the mouth is Waco (population, 30,000). This is an important railway center and the chief city on the river.

Bread, an article of food Wheat is the best material for making bread; but other grains are used, such as rye, barley, Indian corn and rice. The earliest bread was made without leaven or yeast, like the unleavened bread of the Jews and the oat cakes of Scotland and the corn cakes of America. Leaven was used to raise bread, that is, to give it a spongy texture, before yeast. It is simply a portion of moistened flour or dough which has begun to ferment, and so when added to the mass causes the rest to ferment. Leaven is still used, but yeast has very generally taken its place

The usual materials of bread are flour, yeast and water containing salt. Many of the operations of breadmaking are now carried on by machinery. Some bakeries use 2,000 bags of flour in a week. Brown bread is made from the ground but undressed wheat, and so contains the bran as well as the wheat.

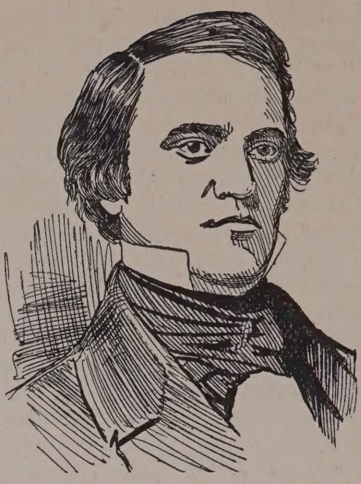
Bread′fruit Tree, a native of southern Asia, of the islands of the South Pacific and of the Indian Archipelago. It is now grown also in some of the West Indies. Growing to a height of forty or fifty feet, it has large, dark-green leaves and a sphere-shaped fruit, about the size of a child's head, weighing sometimes over four pounds. The fruit is the main food of the natives of the South Sea islands. It is covered with a rough rind, and the fruit when ripe is juicy and yellow. It is better, however, before it is fully ripe. When cut up and baked in an oven, it is mealy and nourishing. In taste somewhat sweetish, it is more like a plantain than ordinary wheat bread. When properly cooked, it will keep several weeks. The South Sea natives beat it into a paste, which, slightly fermented, is somewhat sour, but a food they relish. The breadfruit tree will produce two or three crops a year. The wood is used for furniture, for building and for various purposes.



BREADFRUIT

Breakwater, a bank or levee of stones or a timber structure, used to break the violence of the sea in its entrance into a harbor or roadstead. There may be a natural breakwater, as the Isle of Wight, which protects Portsmouth and Southampton. The Romans made artificial breakwaters of some size in several Italian ports. The first modern structure and the greatest of all breakwaters is that at Cherbourg, on the French side of the English Channel. There are also breakwaters in the English harbors of Plymouth, Portland and Holyhead. Several structures of this kind have also been built upon the Great Lakes, as at Buffalo and Cleveland on Lake Erie and at Chicago on Lake Michigan. The one at Buffalo is the largest in the United States. The usual method of building breakwaters is to cast down large stones and allow them to settle under the action of the tides and currents. The top is then covered with large blocks of artificial stone or with paving laid at a regular slope, and a wall is built.

Breck′enridge, John Cabell, an American politician and soldier, was born in Kentucky in 1821. He took part in the Mexican War, and afterward became a member of Congress. In 1856 he was elected vice-president, with Buchanan as president, and four years later was one of the Democratic candidates for president, receiving the electoral votes of most of the southern states. He was elected senator, but entered the Confederate army, where he rose to the rank of major-general. In 1865 he was appointed Confederate secretary of war. Later, he practiced law in Kentucky. He died in 1875.



JOHN C. BRECKENRIDGE

Bremen (*brĕm′en* or *brā̆′men*), one of the three free cities of Germany, stands on both banks of the Weser, which is spanned by four bridges. Though called a free city, it is really a little state, having an area of 99 square miles, which includes, besides the city itself, the port of Bremerhaven and several other small places. It goes back in history to the time of Charlemagne in the 8th century, was at one time a member of the so-called Hanseatic league of cities, and is now a part of the German empire. It has a senate of sixteen members and a council of 150 burgesses. It has a number of old and interesting buildings, but is especially noted for its large trade, in which it holds the second place among the cities of Germany. Its enormous foreign trade extends all over the world, but is largest with the United States. Its exports to the latter embrace aniline dyes, cotton hosiery, cotton lace, furs, hides, skins and leather manufactures, toys, rubber, woolen cloth, etc. From its port about fifty per cent. of all German emigrants set sail, most of them coming to the United States. In one year 52,000 emigrants left its port, and that same year it imported from the United States goods valued at almost $30,000,000. Twenty-five hundred vessels arrive yearly. It is the headquarters of the North German Lloyd steamship company, and is connected by rail with the whole of western and central Germany. Population of the state is 298,736 and that of the city 246,827.

Bremer (*brē′mẽr*), **Frederika,** a well-known Swedish novelist, was born in Finland in 1801, but was brought up near Stockholm, Sweden. She wrote verses as a child; and was well-educated, finishing her studies in Paris. Her first and best novel, *The Neighbors,* was translated into German, French, Dutch, Russian and English, and gave her a wide fame. After writing several other stories, she traveled through many countries, writing description of the people in her *Homes of the New World* and *Life in the Old World* and in many other works. She spent two years in the United States and was cordially received everywhere. The latter years of her life were largely given up to thought and work for women. She has been called the Jane Austen of Sweden. Among her best books are *The Diary; The President's Daughter,* and *Brothers and Sisters.* She died at Arsta in 1865.

Breslau (*brĕs'lou*), the capital of Prussian Silesia, is situated at the junction of the Ohlau and Oder rivers, which divide the city into two parts joined by numerous bridges. The old city is sombre and massive, but the new has many fine specimens of modern architecture. One of the principal buildings is the Protestant Cathedral of St. Elizabeth, a restored Roman Catholic Cathedral of the twelfth century, having the highest steeple in all Prussia. A university, founded by Leopold I in 1702, has a library of more than 400,000 books. There are museums of art and antiquities, fine specimens of early printing and early architecture, and quaint houses. Due to its excellent railroad and river advantages, the city is an important trade center in cloth, timber, coal, glass and grain. Its manufactures include furniture, pianos, textiles, jewelry, machinery, chemical products, beer and spirits. Linen and wool fairs are held, and Breslau ranks as an important wool market. In the eleventh century the city was the capital of the Duchy of Silesia. In 1335 it was taken by Bohemia. It passed to Austria in 1527, and back to Prussia in 1742. Its population, according to the most recent census, is 554,801.

Brest, a city in the Department of Finistere, France, is situated on the north side of the Bay of Brest, about 389 miles west of Paris. This bay is one of the finest harbors of Europe, and was long a bone of contention among European powers. Its fortifications, begun by Cardinal Richelieu in the seventeenth century, and the narrow, strongly protected throat which forms the entrance, make it a formidable naval station. Its industries are mainly connected with the equipment of the navy. Its principal manufactures are leather goods, wax cloth, paper, and rope. The chief exports are beer, grain, brandy and fish. A submarine cable connects the port with America. One of the interesting features of the city is an old castle, and there is a fine promenade along the shore. Several important naval battles have been fought in the vicinity of Brest. During the World War it was a landing place of American troops. According to the census report of 1931, the population is 69,841.

Breton (*brē-tôn'*), **Jules Adolphe,** a distinguished French painter, was born at Courrieres (Pas de Calais), in 1827. He studied his art under Devigne at Ghent, Wappers at Antwerp and Drolling at Paris. In his earlier pictures he employed the French Revolution as subject material. He is best known, however, as a painter of peasant life. His ideal and friend throughout all of his work was the poetic realist, Millet. Among his most famous works are the *Return of the Gleaners; Blessing the Grain; Evening Song of the Lark; The Weeders,* and *The Communicants.* He also wrote poetry and prose of distinction. He died in 1906.

Brewer, David Josiah, an American jurist, was born at Smyrna, Asia Minor, on June 20, 1837, the son of a missionary. He was educated at Wesleyan University, Yale (from which institution he later received the degree of LL.D.), and Albany Law School. He practised law at Leavenworth, Kansas, where he was elected probate judge. In 1870 he became associate-justice of the United States Supreme Court. He was a member of the faculty of the Columbian Law School. Judge Brewer acted on the Venezuelan Commission appointed by President Cleveland, and on the British Venezuelan Arbitration Tribunal. He is the author of *American Citizenship* (1902), and *The Mission of the United States in the Cause of Peace* (1909). He died on March 28, 1910.

Brewing, the process of preparing liquors which are brewed without distilling, as beer and ale. The manufactured process is based on the turning of the starch of the grain (usually barley, but sometimes corn, rice, wheat, rye or other grain) into fermentable sugar, which is transformed by fermentation into alcohol and carbon dioxide gas. In the case of beer, the most common brewed liquor, the characteristic bitter flavor comes from the addition of hops (the yellowish green catkins of the hop vine). Malt is made by steeping, sprouting and drying barley. Germination of the grain develops diastase, an important digestive fluid which has the power to turn the starch in the malt to sugar. As this power is not exhausted by the malt, additional starch is often added at the beginning of brewing proper.

The making of malt is often done in separate establishments. Barley is steeped in cold water for two or three days, to swell and soften the grain. It is then spread on the floor of the malt-house to the depth of a foot or more, and left to sprout, with frequent turnings and constant watching of the grain, which is removed by degrees as it reaches the proper degree of development, usually in about twelve days. It is then dried in the heated kiln, checking germination. The dried product is malt, which is crushed into the grist between iron rollers. The first step in the brewing process proper is the mixing together of a mash composed of this malt grist, barley or whatever grain is used, and hot water. The infusion process, used chiefly in England and France, keeps the entire mash at a set degree of temperature; the decoction process, used in Germany, removes porthem to the main part, thus gradually raising tions of the mixture, boils them and returns the temperature of the whole. Both are used in America, and either will turn the cereal starches into sugar (maltose) which can be fermented. The solubles are filtered and the solid residue is taken away for cattle feed. The filtered liquid, called wort, goes to the brew kettles, where it is concentrated, sterilized, and flavored by boiling for several hours. Hops are added an hour or more before the boiling is finished. In addition to giving the stimulating bitter flavor, they promote the keeping quality. They are removed at the end of the boiling, and yeast is added after the liquid has cooled. Fermentation requires from four to eight days, according to the process used. In bottom fermentation, used for lager beers, the yeast finally sinks to the bottom, whereas in top fermentation the action is more rapid, the yeast rises to the top and is skimmed off. The latter is the general process in Great Britain and is used in the United States chiefly for ales. Fermentation takes place in oaken vats or in steel tanks lined with glass enamel. The carbon dioxide gas which is given off is saved for the future carbonization of the beer. The top fermented beer is soon ready for market, but the lager beers are stored in underground tanks in insulated rooms and aged at an even temperature for several months. Before either kind is ready for market, the carbon dioxide gas must be reinjected into the liquid and it must go through a sterilizing filter which gives it a bright sparkle.

Variation in kinds, amounts and proportions of ingredients, in temperatures of the liquid for different processes, and in length of time for aging, are secret and a large factor in the difference between brands of beer. The water used in brewing has a powerful effect, also, as waters of certain compositions produce beers of distinct qualities. Certain localites have become famous as brewing centers, for this reason. London is noted for dark, full, smooth-tasting beers; and Burton-on-Trent for a light beer with a delicate aroma of hops. The Munich beer is dark and the Dortmund light, largely due to the water. Pilsener fame is caused by the soft Pilsener water which has a low mineral content. Beer color also depends on the raw materials and especially the malt used. The natural malt produces a light beer which can be darkened as desired by adding the malt used for dark beers, which is either made by the German process of malting in a high tight heap on the kiln floor, or by roasting which produces a dark caramelized malt.

Improvements in machinery, great fermenting cellars air-cooled from top to bottom and thus preventing any danger of infection from the floor, clean equipment, and automatic electric ozonizing in lieu of distillation of the water used, as well as great improvement in distributing conditions, are some of the things that have improved the quality of beer. A general barley improvement campaign conducted in the United States from 1932 to 1934 has also made better beer possible. New and revised government grain standards, effective July 2, 1934, included new grades for malting barley, establishing definite standards for the grain east of the Rocky Mountains; and for corn and grain sorghums, effective September 2, 1934. Research is under way to revise the western standards. The banner year in barley production in the United States was 1928, when 357,487,000 bushels were produced, as compared to 182,068,000 in 1922; 302,042,000 in 1932; and 156,104,000 in 1933. Prior to Prohibition, when the annual output of beer reached a peak of 66,000,000 barrels, each barrel of beer required a bushel of malt. In 1899, there were 146 malting companies in the United States, but the process is now centered in a few concerns, or carried on within the breweries themselves. There were ninety-seven malting companies in 1914, fifty-five in 1919, twenty-eight in 1930, and twenty in 1934. Although during Prohibition there were but one-fifth as many firms in business with one-fourth as many employés as in 1899, the malting industry sold more malt and made more money during Prohibition than in that year.

See BEER.

Brewster, Sir David, a noted Scottish natural philosopher and student of science, was born at Jedburgh in 1781. He was for years editor of the *Edinburgh Encyclopædia,* and at the same time was engaged in scientific studies and in writing on kindred subjects. He was a member of a number of societies, was knighted, and received many medals for his discoveries in science. The last few years of his life were spent as principal of Edinburgh University. His name is lastingly connected with the study of optics and the polarization of light. The beautiful and scientific toy called the kaleidoscope was invented by him, and he made many improvements in the stereoscope. He was also an excellent writer, and has left behind him several works besides his articles in magazines and encyclopædias. Among his works are *Letters on Natural Magic,* addressed to Sir Walter Scott; *More Worlds Than One; Martyrs of Science;* a *Life of Newton,* and *Tycho Brahe and Kepler.* He died in 1868.

Brewster, William, one of the most notable of the Pilgrim Fathers, was born at Scrooby in Nottinghamshire, England, in 1560. He studied at Cambridge University, and then attached himself to the Separatists or Nonconformists, and fled to Holland with them, where he taught at Leyden. He came to America with the Pilgrims in the *Mayflower* in 1620, settling at Plymouth, Massachusetts. He was pastor for the new colony and until his death was a loyal and revered leader of the people. He died in 1644.

Briand, Aristide, statesman, was born at Nantes, France, in 1862, the son of a prosperous bourgeois family. He studied law, but began his career in journalism and politics. In April, 1902, he entered Parliament as Socialist-Radical Deputy from the Loire, and almost instantly won fame, by his flashingly brilliant eloquence as an orator. His first achievement was drafting the bill for the separation of Church and State. In 1906 he became Minister of Public Instruction and Worship, which caused him to be read out of the Socialist party. In 1909 he became Prime Minister, following Clemenceau. He served in twenty-three Cabinets, and had the distinction of having been Foreign Minister sixteen times and Prime Minister ten times.

In 1911 he broke the great railway strike in France, by ordering the strikers to join the colors for three weeks' training, and assigning them to the trains they had, as civilians, refused to run.

His career in domestic politics, and his own character, were the sources of his strength as Foreign Minister. The Locarno treaties were the high point of his life-work, coming as a culmination of his long policy of rapprochement with Germany. For this achievement he was awarded the Nobel Peace Prize in 1926. Briand instigated the line of thought and action which resulted in the Kellogg Pact of 1927, also known as the Pact of Paris. The purpose of this document, signed eventually by the leading nations of the world, was to outlaw war.

Briand was a statesman of irreproachable character and powerful personality. His attitude brought a remarkable improvement in the political manners of postwar Europe. It is said that he mobilized good will, and brought a world outlook into diplomacy. He was a master of the art of politics and of the method of handling men. His capacity for friendship, his kindly and courteous approach to any situation, his insistence on a broad outlook and a prevailing peace, did much to temper the chaotic condition of Europe during the years of his statesmanship. Briand was a sincere internationalist. During all of his latter years he advocated the United States of Europe, a plan of his whereby the countries of Europe might work together in economic harmony for the good of all.

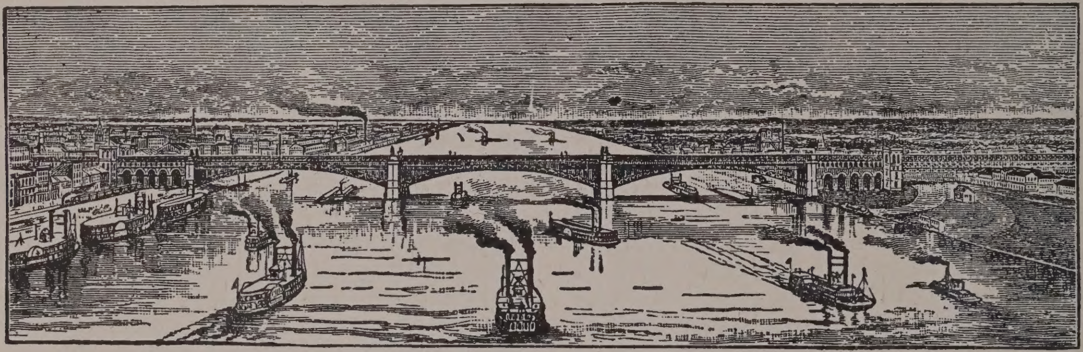
Aristide Briand died suddenly, after an illness, on March 7, 1932, and was buried with public honors.

Briareus (*brī-ā'rē-ŭs*), in the Greek myths one of the sons of Uranus and Gæa (goddess of the earth), is supposed to have been a symbol of such portents as earthquakes or volcanic eruptions. He had fifty heads and one hundred arms, and was imprisoned in the earth by his father. Jupiter released Briareus and his two brothers and by their help won the victory over the Titans. Homer refers to Briareus as helping Jupiter against the plots of Neptune, Minerva and Juno, and as living in the depths of the sea; while Vergil makes him a guardian of the Titans in Hades.

Brick, a building and paving material. The earliest made bricks we know anything about were the sun-dried bricks of Egypt, Assyria and Babylonia. Many of these have been preserved for 4,000 years. The burning of bricks in kilns is also quite ancient, some burnt bricks having been found among the ruins of Babylonia. The ancient bricks, whether baked by the sun or in kilns, were made of clay, mixed with grass or straw. The Romans used brick in most of their buildings, and probably introduced them into England. The people of Holland are great brickmakers, and many of their bricks were brought to America in ships, and are still to be found in buildings in New York. Clay of all kinds can be used for brick if it has the right materials in it. It must not have too much sand, for then the bricks will fall to pieces; but if there is too little sand, the bricks are apt to crack open. After the clay is dug from the ground, it is usually left in the air, and if it can be exposed through the winter it is to advantage, as the frost breaks it up, so that the different materials of the clay can be evenly mixed. When it has been in the air long enough, water is poured on it and it is thoroughly mixed, usually in a mill, though it used to be done by having men tramp it with their bare feet. Anthracite coal-dust is generally mixed with the clay to help in the burning of the bricks. When thoroughly mixed, and all stones and sticks taken out, the clay is put into molds and exposed to the sun to dry. When dried, the bricks are taken to kilns to be burned. Sometimes they are piled up so as to make their own kiln and a fire started inside; by this method half a million or more bricks can be burned at once. The time required to burn bricks varies from a few days to two weeks, according to the method used. Machines are often used to press the clay into the molds before burning, which makes the bricks smoother and firmer; but the expense is so much greater that pressed bricks are used only for fine buildings. The red color of bricks is due to the iron in the clay. In some parts of the United States, clay is used which has so little iron that the bricks are cream or buff color. Fire-bricks are made from clay which has in it very little, if any, material which burns easily. They are used for house-grates and other places where there is strong heat. The size of bricks in America varies from 7¾ to 8⅓ inches in length, and from 4 to 4½ inches in width and from 2¼ to 2½ inches in thickness. Their weight is usually about four pounds. English bricks are 9 inches long, 4½ inches wide and 2½ inches thick.

Bride of Lammermoor, The, a romance by Sir Walter Scott, published in 1819, and forming one of the famous series of the Waverley novels. Its era is that of William III, and it relates the tragic results of an affection mismated by compulsion. The heroine of the story, Lucy Ashton, daughter of Sir W. Ashton, lord-keeper of Scotland, is in love with Edgar, the young master of Ravenswood, and they plight their troth at the Mermaid's Fountain. Lucy, however, is compelled to marry Frank Hayston, laird of Bucklaw, whom the bride, in a fit of insanity, attempts to murder and then dies in convulsions. Bucklaw, nevertheless, recovers and goes abroad, while Colonel Ashton, Lucy's father, appoints a hostile meeting with Edgar, but young Ravenswood, on the way to the place appointed, is lost in the quicksands of Kelpies Flow, in accordance with an old prophecy. Admirable, as a foil to the tragic scenes, is the portrayal of Caleb Balderston, the old butler. The story has been at least twice dramatized, while Donizetti's well known opera of *Lucia di Lammermoor* is founded on it, though with some departure in the details of the plot as narrated by the good Sir Walter.

Bridge, a structure to carry a roadway over a body of water or above the general level of the ground, as across a valley or depression. When the purpose of the structure is to avoid the expense or inconvenience of a permanent embankment the structure is sometimes called a viaduct. If it is to provide an elevated water channel, it is called an aqueduct. The two parts of a bridge are the substructure and the superstructure. The substructure consists of the foundation and of the abutments and piers. The abutments and piers are the parts upon which the superstructure rests. According to the superstructure, bridges are divided into classes as follows: girder, arch, suspension and cantilever bridges. The first three are represented by a plank across a stream, a brick arch and two ropes supporting a suspended platform. The cantilever is a combination of two brackets with a girder between them.



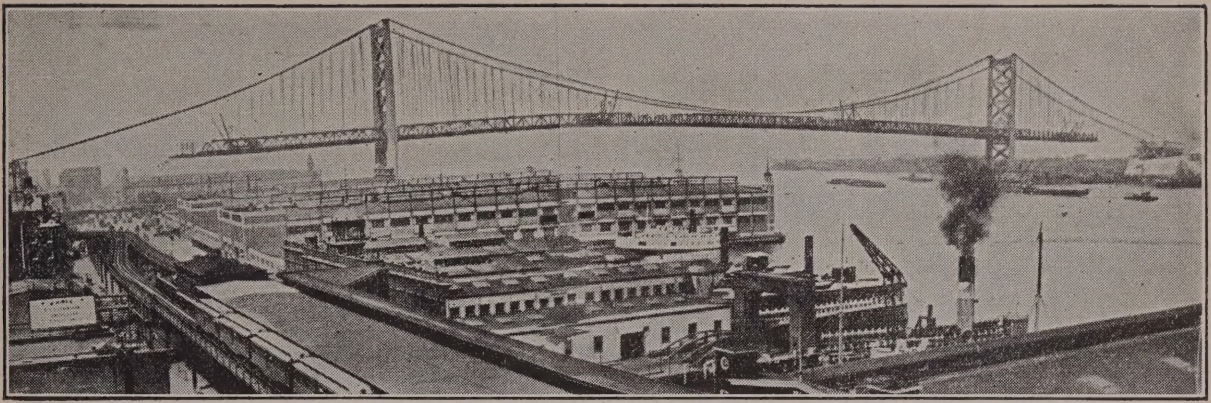
EADS BRIDGE OVER THE MISSISSIPPI RIVER

The earliest bridges were made of wood, but masonry arches were made in very early times by both the Romans and Chinese. Cast iron was introduced as a bridge material in the arch bridge across the Severn in 1779. At the present time steel has practically superseded wood for bridge construction.

In a girder bridge there are beams extending from support to support of the substructure. When the beam is not solid, but made up of a network of bars and rods, so that the whole acts like a single beam, it is called a truss. Trusses are of various kinds. The Whipple and Pratt are common trusses in American bridges. There are two long beams or cords connected by diagonals. Early in the century trusses were made of wood, and numbers of such bridges are still in use in the eastern United States. They were later succeeded by combination trusses in which wood and cast iron and wrought iron were used, but all trusses are now more cheaply made of steel.

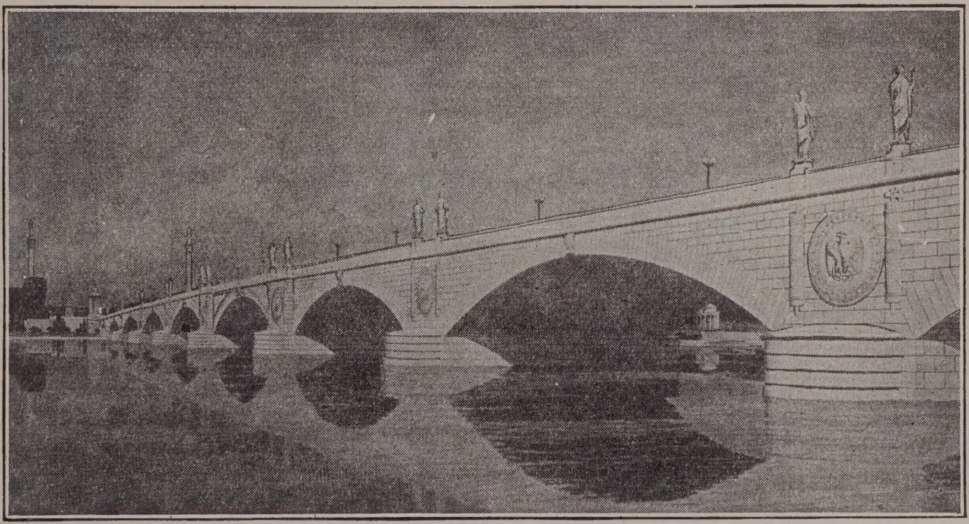
A peculiar form of the girder bridge was the tubular bridge, which consisted of a rectangular iron tube resting on the piers. The roadbed was through the tube. The Victoria bridge across the St. Lawrence at Montreal is one of the largest and the finest bridges of this kind. It is a railway bridge nearly 1¾ miles long, with a central span 330 feet long and twenty-four spans of 242 feet. It cost $7,000,000. Tubular bridges have been superseded by other forms which are cheaper and better. Arch bridges are made of masonry, of iron, or of steel. One of the largest masonry arched bridges is the Trezzo bridge over the river Adda in Italy. It has an arch with 250 feet span. Of recent arched bridges, the Eads bridge across the Mississippi at St. Louis is one of the best. It consists of three steel arches, the central one of 520 feet span and each of the others of 502 feet span. It carries a double line of railway and an upper roadway for carriages and foot passengers. The arch span of this bridge has since been exceeded by the Garabit bridge in France (span 541 feet) and one other; but the St. Louis bridge is still one of the finest and most beautiful arched bridges in the world. It cost over $6,500,000 and took six years in building.

The first large suspension bridge was the bridge across the Niagara below the Falls. It was built by John A. Roebling in 1852-55, and had a span of 821 feet, at a height of 245 feet above the water. It carried a railroad on the upper platform and a carriage and foot roadway underneath. It was suspended by four cables, each ten inches in diameter and containing 3,640 wires. The largest and finest suspension bridge in the world is the Brooklyn bridge, across the East River at New York. It has a span of 1,600 feet, with a total length of over a mile. The towers are 277 feet high. These towers carry the four suspension cables. Each of these cables is 15½ inches in diameter and composed of 5,282 galvanized iron wires. There is a dis-



DELAWARE RIVER BRIDGE

This picture shows one of the largest bridges in the world, of the most modern type. The picture was taken before the bridge was entirely completed so that you might see how a bridge is made. Notice that it is built straight out over space toward the shore, beginning at each tall sustaining pier. From each pier it was built straight out toward the center of the river the two wings joining at the middle. Each cable is 30 inches in diameter and contains 18,000 strands of wire. The central span is 1,760 feet long. With the approaches, the total length is nearly two miles.



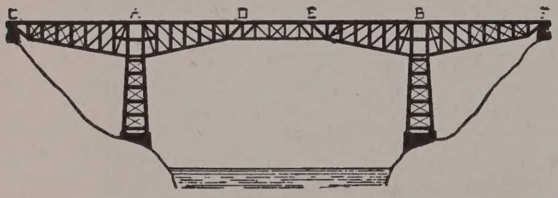
ARLINGTON MEMORIAL BRIDGE

This wonderful bridge, built by the United States Government cost about $15,000,000, and joins Washington, D. C. with the Virginian shore, across the Potomac River. The central span is 160 feet long. There are nine arches. The bridge offers 160 feet of width for vehicles, on either side of which is a sidewalk 15 feet wide. The bridge is simple in design, eagles being the only decorative feature. From a point near the base of the Lincoln memorial, which you can see at the farther end of the bridge, the spans cross the Potomac to the shore of Virginia, from whence roads lead to Arlington cemetery grounds, Lee's Mansion, and Mount Vernon.

tance of 135 feet from high water under the center of the bridge. The bridge has a width of 85 feet, and carries two roadways, two railways and a footway. It was opened in 1883 and cost over $15,000,000. The traffic has increased so that two additional bridges have been built, one to Brooklyn costing $26,000,000 and one to Blackwell's Island costing $17,900,000. It was also proposed to bridge the Hudson River from New York to the New Jersey shore, but the plan has been abandoned, and a tunnel under the Hudson and extending under the East River has been built by the Pennsylvania Railroad.

Bridge, Cantilever. The first modern cantilever bridge was built in 1882 across Niagara, although its principle had been approached in one or two earlier bridges. The advantage of the cantilever bridge is partly in its erection and partly in its long spans. It is the only bridge that can compete with the suspension for long spans. The principle of the cantilever can be understood from the drawing. A and B are two towers, C and D is a truss anchored at C, resting on tower A and projecting over the river. EBF is a similar truss on opposite side. DE is a simple truss supported at D and E, so as to transmit only vertical loads. A load on D tends to lift C, but does not effect EBF. A load on DE is divided between C and D and EBF.

The Forth Bridge in Scotland, one of the most notable bridges in the world, is a cantilever bridge. It has a total length of 8,295 feet, and has two main spans each 1,710 feet long. The largest cantilever structure in the world is the bridge over East River, at New York, known as Blackwell's Island Bridge, built at a cost of nearly $25,000,000. It is double decked, 8,449 feet in length. The length of the main span is 1,182 feet between the towers. On the lower deck, projecting beyond the trusses, is a roadway wide enough for four three-horse teams to pass abreast. On each side of and apart from this roadway are two trolley tracks. In the middle of the upper deck, between the trusses, there are two elevated railroad tracks and two promenades, each eleven feet wide.



CANTILEVER BRIDGE

Bridge of Sighs, The, leads from the palace of the Doge of Venice to the prisons, whence comes its name. The bridge dates as far back as the close of the sixteenth century. Byron refers to it in *Childe Harold.* The bridge is covered above and at the sides, is handsomely built, and divided into two passages for going and returning. The name has been transferred to a bridge in New York City which connects the Tombs jail with the court of justice.

Bridge'port, a railroad and steamboat center and a manufacturing city of Connecticut, lies on Long Island Sound, about fifty-seven miles northeast of New York. It is a fine looking city, has many pleasant environs, and a magnificent esplanade looking out over the sound. It is noted for its manufactures of sewing machines and firearms, automobiles, type-writers, graphophones, silverware and corsets, and it has the largest cartridge factory in the world. Population 160,000.

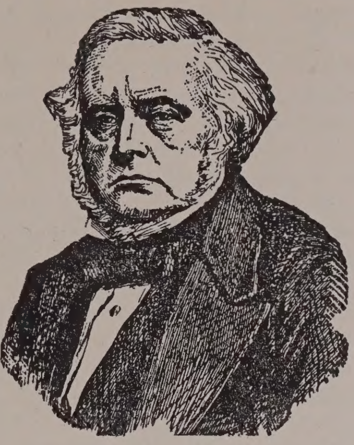
Bridges, Robert, M. A. of Oxford, made poet Laureate of England on the death of Austin (*q. v.*), was born in 1844 on the Isle of Thanet, off the coast of England. He studied medicine and practiced with distinction until 1882 when he retired and devoted himself to literature, in which he had already won distinction. His works include various plays and poems. Among the plays are *Nero*, *Ulysses*, and *The Christian Captives.* His shorter poems include *The Growth of Love*, *Prometheus, the Fire Giver*, and *Fros and Psyche.* In the opinion of a distinguished English critic (Arthur Symons), Mr. Bridges "stands alone in our time as a writer of purely lyric poetry."

Bridge'ton, N. J., a port of entry, a capital of Cumberland County, New Jersey on the Cohansey Creek, thirty-eight mile south of Philadelphia. Two railways connect it with Vineland, eleven miles northeast, and also with towns on the Delaware River and Bay. It is well equipped with schools, among the higher institutions being Ivy Hall Seminary, and a high school, one of the largest in Southern New Jersey, in connection with a good public school system. It has a number of woolen and rolling mills, nail works, glass and carriage factories, is also engaged in fruit and vegetable canning, and manufactures gas-pipe, oilcloth, etc. Population, 14,209

Bridg'man, Laura, a blind mute, was born at Hanover, N. H., Dec. 21, 1829. A bright child, at two fever destroyed sight, hearing and smell, and injured the sense of taste. She learned, however, to make her way about, and even to sew and knit a little. At eight, she went to the Perkins Institute for the Blind, at Boston, where Dr. Howe tried to give her signs by which she could interchange thoughts with others. Then she learned to read raised letters. A set of metal types and a board in which they could be fitted, so as to be read by the fingers, was the next step. In three months she wrote the names of common objects and she learned to know people almost instantly by the touch alone. Later she studied geography, history and algebra, learned to play the piano, to sew and do many other things. Once she asked her teacher: "Man has made houses and vessels, but who made the land and the sea?"

the land and the sea?'' and from that time she began to think about religious questions. She also became skillful as a teacher of the blind and deaf and dumb. She died in 1889.

Bright, John, an English statesman, was born in 1811. He was a Quaker and member of the Society of Friends, and engaged in the cotton-spinning business. He was always interested in political matters and in social reforms, and was a prominent worker in the anti-corn law league. After his election to Parliament, in 1843, he often spoke against the corn laws until they were repealed. He was active also in working for a general adoption of a free-trade system in England and for extensions of the franchise. A member of the so-called Peace Society, he wished to keep his country out of foreign wars, and tried to have the standing army reduced. He was a member of Gladstone's ministry for a number of years. He was an enlightened statesman and one of the most eloquent speakers of his time. He died in 1889.


JOHN BRIGHT

Brighton (*brī'tŭn*), a fashionable watering-place in Sussex, on the English Channel, 50 miles south of London. Built on a slope, rising to a range of chalk cliffs, its healthfulness and the presence of mineral springs have made it popular as a summer resort ever since George IV, then prince of Wales, in 1782 made it his summer residence. Its population is about 131,250, but in addition an average of 30,000 visitors, mostly from London, crowds the resort during the fashionable season. A vast sea wall extends along the coast, and a range of splendid houses fronts the sea for more than three miles, while fine drives and walks render the coast attractive. The Royal pavilion or Marine palace, a fantastic, Oriental structure, is one of the most frequented resorts. A number of well-equipped hotels and fine private residences add to the town's attractions. There are also a college and numerous boarding schools.

Brinton, Daniel Garrison, an American army surgeon, extensive writer a high authority on ethnology and archæology, was born in Thornbury, Pa., May 13, 1837, and died at Atlantic City, N. J., July 31, 1899. He graduated from Yale in 1858, and from Jefferson Medical College in 1861, after which he studied in Germany; and returning to the United States, he entered the Union army as a surgeon and rose to the medical directorship of the 11th army corps. In 1865 he settled in Philadelphia. There he undertook for a time the professorship of ethnology in the Academy of Natural Sciences, and in 1886 was professor of American linguistics and archæology in the University of Pennsylvania. He wrote extensively on the ethnology and antiquities of the Indian tribes of America; on the American race and peoples; and on the myths of the New World, etc.

Brisbane (*brĭz'băn*), capital of Queensland and the chief trading city of the colony, stands on the Brisbane River, about twenty-five miles from its mouth. The channel has been deepened so that large vessels can approach the city. It was founded in 1825 as a penal colony or settlement for convicts, but did not begin to thrive until it was open to free settlers. A fine iron bridge, 1,080 feet long, connects two parts of the city. There are 70 miles of streets. Trade is carried on with Australian ports and with England. Population, with South Brisbane and suburbs, in 1925 about 200,000.

Bris'tol Chan'nel, an inlet of the Atlantic Ocean, in the southwest of England. It is the largest inlet in Britain, with an irregular coast line of 220 miles. It is about eighty miles long and from five to forty-three miles wide. The tides in it rise to an unusual height. The so-called bore occurs here, as in many inlets. It is a wall of water, sometimes from six to nine feet high, which passes up the channel, being produced by the rapid rising of the tide, which pushes the water against the current up the ever-narrowing mouth of the river more rapidly than it can smoothly flow.

Bris'tol is an English mercantile city on the Avon, forming by itself a county. An ancient city, it has taken a prominent part in history. The Cabots sailed from that port on their voyages of discovery in the New World. Bristol men settled Newfoundland, made several attempts to colonize Maine, and established a large trade with the West Indies and the American colonies. Here was built, in 1838, the first transatlantic steamship, the Great Western. Colston the philanthropist founded many charities here, and a day is yearly kept in his honor. Southey was a native of Bristol, and with Coleridge spent many of his early days in the place. The old but beautiful St. Mary Redcliff church was declared by Queen Elizabeth to be ''the fairest and most famous parish church in England.'' Here are two colleges, numerous schools and a free library. Its trade is large. Population, 338,945.

Bristol, R. I., an old historic town, the seat of Bristol County, on Narragansett Bay, also a port of entry, largely availed of, owing to its excellent harbor, where there is a considerable industry in boat-building. It is situated 13 miles south-southeast of Providence, and 7 miles southwest of Fall River, Mass., and is reached by the New York New Haven & Hartford railroad. The peninsula, it is thought, was the Vineland of the Norsemen, and near by were the hamlets of the Narragansett Indian chiefs, Massasoit and King Philip. The place has an early history, the charter of the town dating from the year 1680. It has a number of good schools and a handsome public library, while its industries, besides yacht and boat building, include woolen and cotton mills and rubber works. During the Revolutionary War the town was entered and considerable damage done by the English. Population, 13,000.

Bristol, Tenn. and Va., formerly a consolidated city, the seat of Sullivan County, Tenn., and of Washington County, Va. (Bristol of the latter State being formerly named Goodson). The division line between the two states runs along the main street of the now common city. Though settled in 1851, the present town charter was adopted in 1898, and revised in 1901. The cities now have separate governments, that of Bristol being under a commission. It is reached and served by two railroads, the Southern and the Norfolk & Western road. Its industries embrace furniture, pulp, lumber and flour mills, a tannery and ice and tobacco factories. It is the seat of King College (Presb.), Sullins College (M. E., So.) and the Southwest Virginia (Bapt.) Institute for women, besides a normal school for negroes. Population, 13,395; Bristol (Tenn.), 7,148 and Bristol (Va.), 6,247.

Brit'ish America is the whole of North America north of the United States, under the British flag, except Alaska. It includes almost 3,696,146 square miles. It is divided into the Dominion of Canada, its provinces and territories, and Newfoundland; population, 10,000,000. See CANADA.

British Columbia, Canada's maritime province on the Pacific Ocean, is the third largest in Canada, with an area of 355,855 square miles—90,000 square miles larger than Texas. It is a great irregular quadrangle, about 700 miles from north to south, with an average width of about 400 miles, lying between latitudes 40° and 60° north. It is bounded on the south by the Strait of Juan de Fuca and the States of Washington, Idaho and Montana, on the west by the Pacific Ocean and southern Alaska, on the north by Yukon and Mackenzie Territories, and on the east by the Province of Alberta. From the 49th degree north to the 54th degree the eastern boundary follows the axis of the Rocky Mountains and thence north to the 120th meridian. Pop. 575,000.

The province is traversed from south to north by four principal ranges of mountains—the Rocky and the Selkirk on the east and the Coast and Island ranges on the west. The Rocky Mountain range preserves its continuity, but the Selkirks are broken up into the Purcell, the Selkirk, the Gold and the Cariboo Mountains. Between these ranges and the Rockies lies a valley of remarkable length and regularity extending from the international boundary line, along the western base of the Rockies northerly 700 miles. West of these ranges extends a vast plateau or table land with an average elevation of 3,500 feet above sea level, but so worn away and eroded by water courses that in many parts it presents the appearance of a succession of mountains. In others it spreads out into the wide plains and rolling ground, dotted with low hills, which constitute fine areas of farming and pasture lands. This interior plateau is bounded on the west by the Coast Range, and on the north by a cross range which gradually merges into the Arctic slope.

Rivers and Lakes. One of the noticeable physical features of British Columbia is its position as the watershed of the North Pacific slope. All the great rivers flowing into the Pacific Ocean, with the exception of the Colorado, find their sources within its boundaries. The more important of these are the Columbia (the principal waterway of the state of Washington), which flows through the province for over 600 miles; the Fraser, 750 miles long; the Skeena, 300 miles; the Thompson, the Kootenay, the Naas, the Stikine, the Liard and the Peace. These streams with their numerous tributaries and branches drain an area equal to about one tenth of the North American continent. The lake system of British Columbia is extensive and important, furnishing convenient transportation facilities in the interior. Some of the principal lakes are Atlin, area 211,600 acres; Babine, 196,000 acres; Chilco, 109,700 acres; Kootenay, 141,120 acres; Upper Arrow, 64,500 acres; Lower Arrow, 40.960 acres; Okanagan, 86,240 acres; Shuswap, 79,150 acres; Harrison, 78,400 acres.

Many of the smaller streams are not navigable but these furnish driveways to the lumbermen and supply power for sawmills and electric plants and water for irrigation. Water power is practically unlimited and so widely distributed that no portion of the province need be without cheap motive power for driving all necessary machinery.

Climate. Varied climatic conditions prevail in British Columbia. The Japanese current and the moisture-laden winds from the Pacific exercise a moderating influence upon the climate of the coast and provide a copious rainfall. The westerly winds are arrested in their passage east by the Coast

Range, thus creating what is known as the dry belt east of those mountains, but the higher currents of air carry the moisture to the loftier peaks of the Selkirks, causing the heavy snow fall which distinguishes that range from its eastern neighbor, the Rockies. Thus a series of alternate moist and dry belts is formed. As a consequence of the purity of its air, its freedom from malaria and the almost total absence of extremes of heat and cold, British Columbia may be regarded as a vast sanitarium.

The climate of Vancouver Island and the coast generally corresponds very closely with that of England; the summers are warm with much bright sunshine, and severe frost scarcely ever occurs in winter. On the mainland similar conditions prevail till the higher levels are reached, where the winters are cooler. At Agassiz, on the Lower Fraser, the average mean temperature is in January 33 degrees and in July 64 degrees; the lowest temperature on record at this point is 13 degrees, and the highest 97 degrees. There are no summer frosts, and the annual rainfall is 67 inches, 95 per cent. of which falls during the autumn and winter.

To the eastward of the Coast Range, in Yale and West Kootenay the climate is quite different. The summers are warmer, the winters colder and the rainfalls are rather light—bright dry weather being the rule. The cold of winter is, however, scarcely ever severe, and the hottest days of summer are made pleasant by the fact that the air is dry and the nights are cool. Further north, in the undeveloped parts of the province, the winters are more severe.

Resources. With the exception of nickel (which has not yet been discovered in quantity) all that the other provinces of Canada boast of possessing in the way of raw material is here in abundance. Its 75,000,000,000 tons of coal are sufficient to supply the world for centuries; it possesses the greatest compact area of merchantable timber in North America; the mines have produced $35,000,000 yearly, and they are only in the early stages of development; the fisheries produce an annual average of over $12,000,000, and apart from salmon fishing their importance is only beginning to be realized; there are immense deposits of magnetite and hematite iron of the finest quality which still remain undeveloped; the agricultural and fruit lands, cattle ranges and dairies produce annually, in value, $22,000,000; and less than one tenth of the available land is settled upon, much less cultivated; the province has millions of acres of pulpwood as yet unexploited; petroleum deposits, but recently discovered, are among the most extensive in the world; and much of the province is still unexplored and is potential value unknown. With all this undeveloped wealth within its borders can it be wondered at that British Columbians are sanguine of the future?

Agriculture. Considerable tracts of land in the province are highly suitable for mixed farming, and in some districts fruit growing is extensively and most profitably engaged in.

Education. The educational facilities of the province are varied and excellent. The expenditure for schools amounts to over $1,100,000 a year. The government builds a schoolhouse, makes a grant for incidental expenses and pays a teacher in every district where 20 children between the ages of 6 and 16 can be brought together. For outlying farming districts and mining camps the arrangements are very satisfactory. High schools also are established in cities, where classics and mathematics are taught. Several of the cities in the province have full charge of their own public and high schools, and these receive a very liberal per capita grant in aid from the provincial government.

Trade and Transportation. In 1903 the imports amounted to $11,141,068, and the exports totalled $15,604,896. In 1913 the imports were $66,595,479 and the exports $27,087,369, and the trade of the province continues to grow rapidly with its agricultural and commercial development. The leading articles of export are fish, coal, gold, silver, copper, lead, timber, masts, spars, furs and skins, whale products, fish-oil, hops and fruit. A large portion of the salmon, canned and pickled, goes to Great Britain, eastern Canada, the United States, Hawaiian Islands, Australia and Japan; the United States consumes a large share of the exported coal; and immense quantities of lumber are shipped to Great Britain, South Africa, China, Japan, India, South America and Australia. A large interprovincial trade with Alberta, Saskatchewan, Manitoba and the eastern provinces is rapidly developing, the fruit grown in British Columbia being largely shipped to the prairie provinces, where it finds a good market. With the shipping facilities offered by the Canadian Pacific Railway and its magnificent fleets of steamships running to Japan, China, New Zealand, Australia and Hawaii, backed by her natural advantages of climate and geographical position, British Columbia's already large trade is rapidly increasing. The tonnage of vessels employed in the coasting trade is 12,025,510 tons, and of sea-going vessels carrying cargoes to and from the ports of the province, 4,672,058 tons. The Canadian Pacific is the principal railway in the province. It has two main lines, the Canadian Pacific Railway and the Crowsnest Pass Railway, and several branches and steamboat connections on the inland lakes, besides its large fleet of ocean-going and coasting steamers. The railway mileage of the province is about 2,000 miles.

The Canadian Pacific Railway Company operates the Esquimalt and Nanaimo Railway on Vancouver Island, running from Victoria to Alberine, a distance of 145 miles. The company also administers the Esquimalt and Nanaimo land grant, some 1,500,000 acres, the settlement of which required the extension of the Esquimalt and Nanaimo main line and the building of branches.

Districts of British Columbia. British Columbia is divided into the following districts:

Kootenay (East and West)	15,000,000	acres
Yale	15,500,000	“
Lillooet	10,000,000	“
Westminster	4,900,000	“
Cariboo	96,000,000	“
Cassiar	100,000,000	“
Comox (Mainland)	4,000,000	“
Vancouver Island	10,496,000	“

Additional information concerning each of these districts is given elsewhere in these volumes.

British East Africa. This territory, governed directly from the foreign office, includes an immense area on the mainland as well as the islands of Zanzibar and Pemba, which are immediately under the control of their Arab sultan. To the north and east the British sphere of influence (which merges with the Sudan provinces of Egypt) is bounded by the Juba River as far as the sixth parallel of north latitude, along that to the thirty-fifth meridian of east longitude, and up that meridian to the Blue Nile. It marches with the Italian sphere of influence and with Abyssinia to the Egyptian frontier. On the south the territory runs northwest from the north bank of the mouth of the Umba River to the north of Kilimanjaro to the point where the first parallel of south latitude meets Lake Victoria and thence across the lake westward of that parallel to the frontier of the Congo Free State at the thirtieth meridian of east longitude and on north to the Nile-Congo watershed. North of the source of the Mbomu the British sphere is without limitation, extending to the independent Muslim states of those parts. Its total area is probably in excess of a million square miles. The Imperial British East Africa Company, which had been instrumental in opening up the territory under concessions from the Sultan of Zanzibar, evacuated its territory in favor of the government on June 30, 1895, and the entire land was divided into the British East Africa Protectorate and the Uganda Protectorate for purposes of administration.

British East Africa Protectorate, The, extends from the Umba to the Juba River, running as far inland as the Uganda boundary, with an area of about 177,100 square miles, and a population of 4,038,000, of which 25,000 are Asiatics and 2,000 Europeans or of mixed European and Asiatic blood. The capital is Mombasa, with a population of 30,000. It is divided into seven provinces and an unorganized territory lying to the north and west, each under a subcommissioner. These, with their districts and subdistricts, are as follows: Mombasa, where the commissioner and commander-in-chief has his residence and where the courts of justice are situated, is in the province of Seyidie, which includes the districts of Vanga, Mombasa, Malindi and Taita and the subdistricts of Rabai, Takaungu and Taveta; Ukamba includes the districts of Masailand and Ulu, with Nairobi for its capital; Tanaland has for its districts Lamu and the Tana River, and Lamu for its capital; Jubaland is divided into Upper and Lower Jubaland, Kismayu being the capital; Kenya into Fort Hall and Nyeri, governed from Fort Hall; Naivasha is the name of both the capital and province and includes the districts of Naivasha, Eldama Ravine and Baringo; and Kisumu includes Kisumu, Mumias, Nandi, Kericho, Soba and Ugaya, its capital Port Florance.

The chief imports were cotton goods, provisions, rice, grain and flour and building materials; the chief exports ivory, copra, grain and hides and horns.

The Mombasa-Victoria Railway is now 584 miles long. There are 7 telegraph lines with a total length of 1,422 miles, from Mombasa to Lamu, Mombasa to Kisumu and Kisumu to Entebbe in Uganda. A cable connects Mombasa and Zanzibar.

Brit'ish Museum, a great national institution, on Great Russel Street, London. It was opened in 1759, and is constantly growing in size and value. The present building was erected at an expense of several millions. There are eleven departments. The largest one is that of *Printed Books.* There are upwards of two million books, and many of them old and rare; in the collection are the libraries of several English kings and great Englishmen; and books in all languages. The reading room, under the vast dome, larger than that of St. Peter's, has over 600 readers daily. The departments of *Maps* and *Manuscripts* are also valuable. That of *Prints and Drawings* contains works of the great masters, drawings of Michael Angelo, Raphael, etc.; fine collections of etchings by Rembrandt and of engravings by Hogarth. The department of *Oriental Antiquities* includes Egyptian monuments and the celebrated Rosetta stone, which furnished the key to the hieroglyphics, and the results of excavations in Assyria. One of the finest branches of the museum is the department of *Greek and Roman Antiquities.* Here are fine collections of the sculptures of Athens and Attica, among them the famous decorations of the Parthenon, which form the most valuable monument of Greek art which has come down to modern times. Besides the other departments of *Zoology*, *Botany*, *Geol-*

ogy, etc., the *Natural History Museum* at South Kensington has also been added to the British Museum, making it one of the finest institutions of the kind in the world.

British New Guinea. The British portion of the island of New Guinea has been taken over by the commonwealth of Australia, by a federal act which went into force in 1906, the assumed region now being known as the Territory of Papua. The work of civilization is going on rapidly, great tracts of territory being now occupied by peaceful natives, talling more and more under missionary influence. There are three ports of entry, Port Moresby, Samarai and Laru, with a central court at the first named, the whole territory being divided into six districts for purposes of justice The D'Entrecasteaux and Louisiade groups of islands are included in the New Guinea territory. The revenue, derived largely from import duties in 1907, amounted to $398,355, and the exports for the same year were $401,450. The great forests of the island yield valuable timber and precious woods; gold has been found on the Louisiade Islands, on Woodlark Island and to some extent on the mainland. The principal exports are trepang, copra, pearl shell and pearls, gold, coffee and rubber; the imports are food stuffs, tobacco, cloths and hardware. Nearly all the trade is with Queensland and New South Wales, and for postal and all other purposes the island is treated now as part of the Australian Commonwealth.

Brit'tany, an ancient province of France, consisting of the great northwestern peninsula, which is shaped like a triangle. It now forms five departments, Finistère, Côtes-du-Nord, Morbihan, Ille-et-Vilaine and Loire-Inférieure. It is also usually divided into Upper and Lower Brittany. It covers 13,643 square miles. The Bretons, as the people are called, numbering about 3,224,369, are peculiar in many ways. They are strongly attached to their country and customs, and oppose all changes. During the French Revolution they were loyal to the old house of Bourbon. Though not noted in matters of commerce and manufactures, they are among the boldest seamen in the world and are to be met with in the most distant waters. British colonies settled here as early as the 3d century, and by the 5th century had changed the original name of Armorica to Brittany. It was at different times under the sway of Italy, but gradually became a part of France. The Breton folk-lore and folk-songs consist of a vast wealth of traditional stories and songs. The country abounds in remains of the ancient religion of the Druids. Brittany has given many great men to the world, among them Abelard, Jacques Cartier, Châteaubriand, Jules Simon and Ernest Renan. Rennes, once the capital of ancient Brittany, is now the capital of the French department of Ille-et-Vilaine. Population, 79,372.

Brobdingnag (*brŏb'dĭng-năg'*), a wonderful land, described by Dean Swift in his *Gulliver's Travels*, the inhabitants thereof and all natural objects being of gigantic size; hence, to speak of a man as brobdingnagian is to signify one of unusual, indeed of mammoth, height. The term indicating this strange, imaginative land, is frequently, though incorrectly, spelled *Brobdignag*.

Brock, Sir Isaac, administrator of the province of Upper Canada (now Ontario) for two sessions of Parliament. Commander of the forces of the province and the representative of His Majesty as well administering its civil affairs. War was declared by the United States against Great Britain on the 18th of June, 1812, and the province was invaded. General Brock's military record is a splendid one. He fell on the 13th day of October, 1812, while bravely leading a charge up Queenston Heights. A few hours after his death the enemy's position was taken, and the American army and its commander surrendered. A handsome monument in memory of his achievements was erected by the province on Queenston Heights.

Brocken, The. See WALPURGIS NIGHT.

Brock'ton, a city in Plymouth Co., Massachusetts. It received its present name in 1874, having formerly been called North Bridgewater. It is a wealthy place and quite a business center. The manufacture of boots, shoes and rubber goods is carried on extensively. Shoe machinery and supplies, tools, bicycles, etc. are also made here. The city has admirable public schools and valuable school property. Population, 72,000.

Brock'ville, a city of 9,000 in eastern Ontario, is beautifully situated on the St. Lawrence River near the Thousand Islands, and is called after General Brock. It is the center of a rich dairying district, and has a large cheese market. One of the hospitals for the insane owned and maintained by the province is located here, occupying a commanding position overlooking the St. Lawrence River. It is served by both the Grand Trunk and Canadian Pacific Railways.

Brok or **Brock,** was one of the dwarfs in the Norse mythology, skilled in handwork, who, having incurred the wrath of Odin, was sent by him to work in the under darkness.

Brontë (*brŏn'tĕ*), **Charlotte,** one of the most gifted of English novelists, who wrote under the pen-name of Currer Bell, was born at Thornton, in Yorkshire, in 1816. Almost all her life was one of sorrow and struggle, which showed itself in her character and in her books. She herself was the heroine of *Jane Eyre*, her greatest novel; and the Lowood of that story was a picture of her own sad school-life. She had two sisters, also with decided literary talent, and their death still further darkened her life. Her other chief novels are *Shirley*, *Villette* and *The Professor*. *Jane Eyre* has been translated into most European languages, and dramatized in England and Germany, under the title of *The Orphan of Lowood*. She died in 1855, having in the previous year married the Reverend Arthur Nicholls, her father's curate. See Mrs. Gaskell's *Life of Charlotte Brontë*.

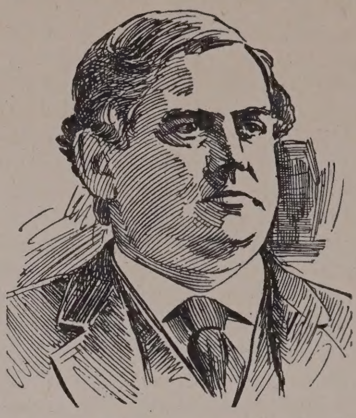
Bronze (*brŏnz*), an alloy of copper and tin. It is harder than copper but less malleable. It was long used by the ancients for weapons and utensils, and is now widely used for statues, machinery and cannon. It is also used for parts of telescopes. In making bronze, the metals are melted separately, and then poured together, stirred and turned into molds. The many varieties of bronze have different proportions of the metals, and lead, zinc and silver are sometimes added. Bell metal has seventy-eight parts of copper and twenty-two of tin. Cannon metal has much more copper. The temperature of the alloy when poured and the rapidity of cooling also have an effect on the quality of the bronze. Copper and aluminum also produce an alloy called bronze.

Bronze, Age of, a term used to denote the stage of culture of a people using bronze for weapons, cutting tools, etc. Before it comes the Age of Stone, and after it the Age of Iron. This order of development is not true of all nations, nor did these different stages exist at the same period in all nations. Thus, in the time of Homer, the Greeks were passing from the use of bronze to that of iron; while the Mexicans were still in the bronze age in very recent times. Among the tools and weapons of the bronze age are knives, saws, sickles, awls, hammers, anvils, axes, swords, spears, arrows, daggers and shields. The forms of these articles were constantly changing from one age to another, and also during the progress of a single age. The composition of the bronze used was about ninety parts of copper and ten of tin.

Brook'line, Mass., an old historic town, now an elegant residential suburb of Boston, in Norfolk County, connected with Boston by steam and street cars (a three-mile ride). It lies on the Charles River, and has many fine villas and country seats; it is also reached by the Boston and Albany R. R. Annexation has frequently been proposed to it by Boston, but it coyly refuses the temptation to join the city. It has some manufacturing interests, chiefly of electrical supplies, screens, etc.; it also has a riding academy and a public library. The population is now 41,000.

Brooklyn, N. Y. (See New York City.)

Brooks, Phillips, late Episcopal bishop of Massachusetts, was born at Boston in 1835, and graduated at Harvard College and at the Theological Seminary at Alexandria, Va. He was rector for some years of churches in Philadelphia, and in 1869 was made rector of Trinity Church in Boston. In 1891 he was elected bishop of Massachusetts. He was one of the finest pulpit-orators of any denomination—a man of high ideals, spiritual thought and commanding influence. See his *Life and Letters*, by Prof. Alex. V. G. Allen. Bishop Brooks died at Boston Jan. 23, 1893.



PHILLIPS BROOKS

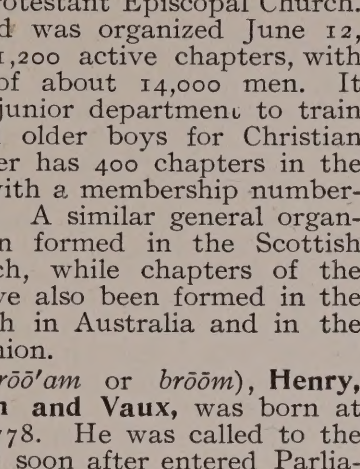
Broom (*Cytisus scopatius*), an evergreen shrub found growing on heaths and on dry soils, bearing twig-like branches and large yellow flowers. The tough twigs are made use of for thatching purposes and in the making of besoms or brooms for household sweeping. The *Cytisus albus* or white broom is a native of Europe and much cultivated in England as an ornamental shrub. It attains frequently a height of from 12 to 15 feet, and its white flowers are much admired. A Spanish variety is used for its medical properties, its tops and seeds, which are strongly diuretic, being beneficial in cases of dropsy. The broom, the *planta genista*, as it is known, gave its name to the Plantagenet royal family, an ancestor of which used the broom for his crest.

Broom-Corn (*Sorghum vulgare*), a native of the East Indies, largely cultivated in the United States. It grows to the height of eight or ten feet, has a jointed stem, the panicle of which is extensively used in the manufacture of whisks and brooms. It is sometimes utilized for forage, but is not of much value as such. It is propagated considerably in Kansas and Nebraska as well as in the east, and chiefly in the Mohawk Valley of New York state An acre will produce from 500 to 600 pounds of the material for making brooms.

Brotherhood of Andrew and Philip, founded in 1888 by the Rev. Dr. Rufus W. Miller, of Philadelphia, present President of the General Council. The organization, which held its first federal convention in New York city in 1893, is composed of members of 23 Evangelical denominations, in this country, besides chapters in Australia and Japan. Its objects are indicated in the statement that "any man can belong to the Brotherhood who will promise to pray daily for the spread of the Kingdom of Christ among men and to make an earnest effort each week to bring at least one man within the hearing of the Gospel." The number of chapters of the Brotherhood in the United States is, at present writing, 875, with a total membership of 25,000 in 44 states.

Brotherhood of St. Andrew, The, is an organization with objects in view similar to those of the Brotherhood of Andrew and Philip, though its operations are confined to men of the Protestant Episcopal Church. The Brotherhood was organized June 12, 1896, and has 1,200 active chapters, with a membership of about 14,000 men. It also includes a junior department to train young men and older boys for Christian work. The latter has 400 chapters in the United States, with a membership numbering about 5,000. A similar general organization has been formed in the Scottish Episcopal Church, while chapters of the Brotherhood have also been formed in the Episcopal Church in Australia and in the Canadian Dominion.

Brougham (*brōō'am* or *brōōm*), **Henry, Lord Brougham and Vaux,** was born at Edinburgh in 1778. He was called to the English bar and soon after entered Parliament, taking sides with the Liberals. He spoke against slavery and was active in all measures of reform. He became immensely popular with the people and wielded a great influence, being recognized by the Liberals as their leader in debate. He received a peerage and became lord chancellor in the so-called Reform Ministry. As an advocate, also, though he never had a large practice, he attained some fame, his greatest speech being that in behalf of Queen Caroline against George IV. He was interested in science and literature, and his writings cover a wide range of subjects. The founding of London University was largely due to him. As an orator he was inferior only to Canning among the men of his time. He was peculiar in many ways, and while for many years the popular idol was not liked by those who worked with him. He built a chateau at Cannes, in the south of France, and died there in 1868. It was once said of him as he was passing along in a carriage: "There go Solon, Lycurgus, Demosthenes, Archimedes, Sir Isaac Newton, Lord Chesterfield and a great many more in one post-chaise."



LORD BROUGHAM

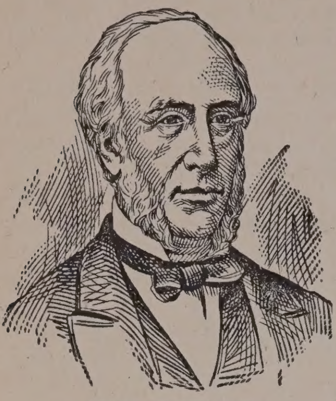
Broughton (*bra̤'tŭn* or *brou'tŭn*), **Rhoda,** an English novelist, was born in North Wales, November 29, 1840, and for forty years has actively been engaged in the production of fiction. In 1867 she made her successful *début* with her popular novel, *Cometh Up as a Flower*, which was followed by *Not Wisely but Too Well* and in 1870 by *Red as a Rose is She.* Her later stories include *Nancy, Joan, Second Thoughts. Belinda, Dr. Cupid, Alas! Dear Faustina. The Game and the Candle, Foes in Law* and *Lavinia.*

Brown, Charles Brockden, an early American novelist, much prized in his day, was born at Philadelphia in 1771, and died there in 1810. His two best-known stories are *Wieland or the Transformation* and *Arthur Mervyn.* The former is an alluring though improbable tale, of a ventriloquist, who, by personating a supernatural being, leads the hero to kill his wife and children; the latter gives a vivid description of Philadelphia, when, in 1783, the city was scourged by yellow fever. His other stories, *Ormond, Edgar Huntley, Jane Talbot* and *Philip Stanley* are now but little read. Early in the century he brought out semi-annually for a time *The American Register*, a useful work of literary and historic reference.

Brown, Elmer Ellsworth. Born in Chatauqua County, New York, in 1861, Mr. Brown graduated from the Illinois State Normal University in 1881, and afterward studied both in the University of Michigan and abroad, receiving his degree of Doctor of Philosophy in Halle, Germany, in 1890. He was principal of schools in Belvidere, Ill., for three years, and in Jackson, Mich., for one year. From 1884 to 1887 he was assistant state secretary of the Y. M. C. A. in Illinois. After returning from Germany, Mr. Brown became assistant professor of the science and art of teaching in the University of Michigan, and in 1893 he became professor of the theory and practice of education in the University of California. From 1906 to 1911 he was United States commissioner of education and later became chancellor of New York University. He is connected with many important educational bodies and is the author of educational works.

Brown, Hon. George, born in Edinburgh in 1821. Came to New York in 1838. In 1843 the family came to Toronto (Canada). In 1844 *The Globe* was first published. With it the name of George Brown is inseparately and honorably connected. Since its first publication it has been a powerful force in Canada. In 1848 it became the organ of the Liberal government.

In 1851 Mr. Brown was elected to Parliament for Kent County (western Ontario), and took his seat in 1852. In 1854 he was elected for Lambton. In 1857 he was returned for two ridings at the same time: North Oxford and the City of Toronto. Called on to form an administration which was short-lived. He was mainly influential as editor of *The Globe,* and one of the fathers of confederation. He died on May 9th, 1880.


GEORGE BROWN

Brown, Henry Billings, associate-justice of the United States supreme court, was born at South Lee, Mass., March 2, 1836, and after graduating at Yale studied law and was admitted to the bar in Wayne County, Mich., in July, 1860. From 1861 to 1863 he was deputy United States marshal for his district, and from 1863 to 1868 acted as assistant United States attorney for the eastern district of Michigan. He afterwards practiced law at Detroit, and from 1875 to 1890 he was United States judge for the eastern district of his state (Michigan), and compiler for a number of years of Brown's *Admiralty Reports.* In January, 1891, he was appointed to the United States supreme court as an associate-justice, taking up his residence at Washington, D. C.

Brown, John, an American abolitionist, was born at Torrington, Connecticut, May 9, 1800. Descended from one of the Pilgrims who landed in the *Mayflower,* he retained the old Puritan spirit of sternness. The idea of liberating the slave early became his master passion. Having failed in business, he settled on a farm in New York state, from which he was called by his sons, who had settled in Kansas, to assist them in the struggle then going on between the pro-slavery and anti-slavery men. Here he became a leader in the border warfare. His most famous engagements were the combat of Black Jack, where he drove back a superior force of Missourians, and the encounter from which he received the name of Ossawatomie, resisting for almost an hour a body of 500 men with only fifteen men, and then making good his escape. He assisted a number of slaves to escape to Kansas, and tried to interest people in the east in his plans; but he was looked upon as a fanatic. He planned to attack slavery on its own ground, and relied on the slaves rallying to his standard to make good his attack. He even drew up a constitution and elected officers, but claimed that he had no intention of overthrowing the government. His plan included the seizure of the United States arsenal at Harper's Ferry, Virginia. Going to Hagerstown, Maryland, near Harper's Ferry, Brown took a farm and gradually gathered about twenty-two persons, seventeen of them being white men. Arms and ammunition were secretly shipped to him, and on the night of October 16, 1859, he seized the arsenal, liberated the slaves of the city, and captured sixty citizens. But the negroes failed to rally around him; his men were gradually picked off, though a number of the citizens were also killed; and on the morning of the 18th the door of the engine room to which he had retreated was battered down, and he and the few survivors were overpowered and captured by United States troops under Col. Robert E. Lee. Brown was taken to Charlestown, Virginia, and tried and condemned for treason and murder. To the last he preserved his dauntless bearing, freely admitted the object of the attack, and only deplored its failure. He was hanged December 2, 1859. His attempt and death and the investigations that followed undoubtedly had an effect in bringing to a focus the difference of opinion between the two sections of the country on the question of slavery, and hurried on the Civil War.

Brown, Joseph Emerson, American politician, war governor of Georgia and for a time chief justice of the state supreme court, was born in South Carolina in 1821, and died at Atlanta, Ga., November 30, 1894. In 1849 he was elected to the state senate of Georgia, and was Democratic governor of the state successively from 1857 to 1863. When the Civil War broke out, he became an active secessionist, and on January 3, 1861, he seized Forts Pulaski and Jackson, near Savannah, a fortnight before his state seceded, and also took possession of the United States arsenal at Augusta. He warmly espoused the southern cause and was a stout supporter of the Confederate government, though he disputed the constitutionality of Jefferson Davis's acts of conscription. Near the close of the war he was imprisoned for a time by the national government, but, being released, he resigned his governorship, and in 1866 visited Washington and urged his state to accept the issues of the struggle and comply with the pacific measures of reconstruction. This made him unpopular with the south and his Democratic friends, and for a while he joined the Republicans, only, however, to return at length to his own political fold. He was afterward a member of the United States senate. He left a considerable fortune, though he was a large benefactor of the Georgia University and of the Southern Baptist Theological Seminary at Louisville, Kentucky.